Engineering Library

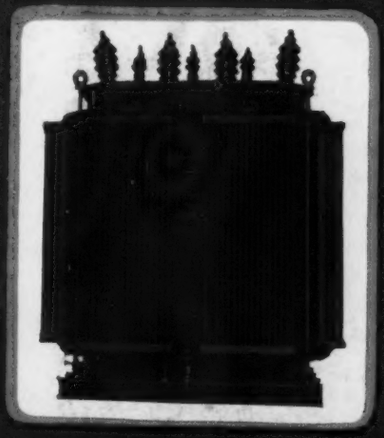
Founded 1874—Fifty-Three Years of Service

SEP 7 1927

Electrical World

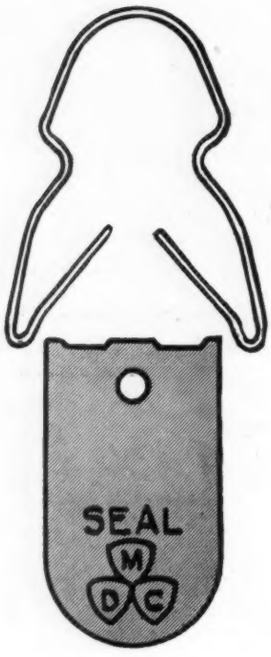
McGraw-Hill Publishing Company, Inc. September 3, 1927 Twenty-five Cents Per Copy

Moloney economy continues to determine Moloney popularity



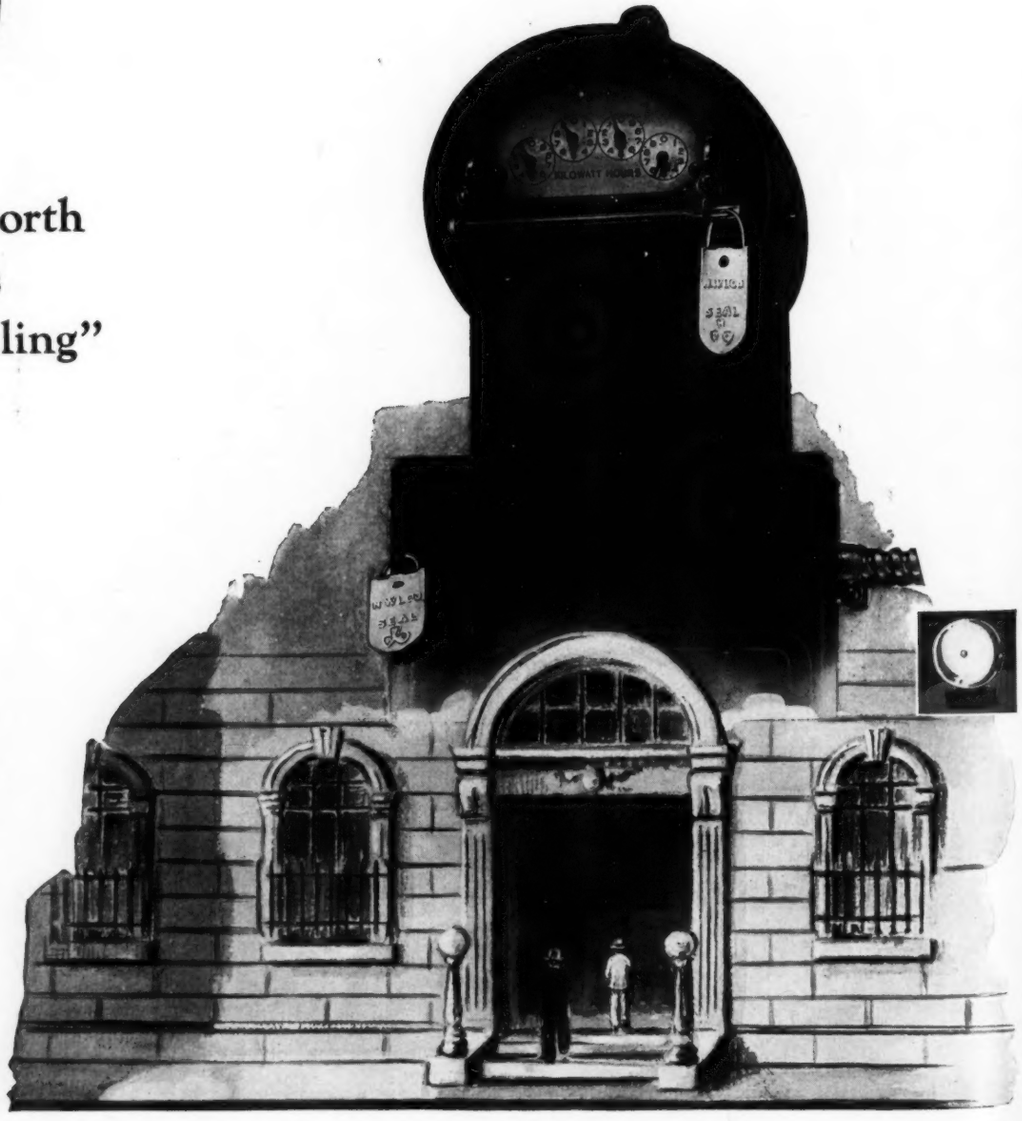
MOLONEY ELECTRIC COMPANY
Main Office and Factories: St. Louis, Missouri
Sales Offices in Principal Cities

MOLONEY
TRANSFORMERS



The Murray Padlock Seal is the "Kilowatt Bank Alarm"

"What's worth stealing is worth sealing"



A central station standard for more than 20 years. On what quantity shall we quote?

Metropolitan Device Corporation

1250 Atlantic Ave., Brooklyn, N. Y.

Electrical World

Published by McGraw-Hill Publishing Company, Inc.
W. H. ONKEN, JR.
Editor

VOLUME 90 — *New York, Saturday, September 3, 1927* — NUMBER 10

The Threatened Investigation of the Power Industry

ALTHOUGH Congress will not assemble for three months, the air is already rife with rumors of contemplated legislation of interest to the electrical industry. Muscle Shoals and the Colorado River, it may be taken for granted, will come up for discussion, but whether definite action will follow only a rash prophet will predict. What is most to be feared from Washington this session, however, is the threatened investigation of electric light and power companies, and particularly holding companies, by a senatorial committee headed by Senator Walsh of Montana. Not necessarily because of any shortcomings of the electric light and power industry as a whole, for it has an admirable record; but because of the detrimental effect of the publicity on the security market.

Next year is presidential year, and there are many aspirants with lightning rods down their backs seeking to be struck. To such men publicity is like a spring of water to the parched earth. It is unfortunate that investigations of this kind may be started on whims and that the motives back of them are not always above suspicion; but if an investigation is to come, it might as well come now when the electric light and power industry can best stand it. The findings may be an agreeable surprise or a heavy shock; yet the industry may make up its mind that the inquiry will not seek to advertise the accomplishments of electric public utilities, but, on the contrary, to distort and magnify blameworthy actions of a few to the detriment of the many. Any exposures of wrongdoing will be welcome, for the industry cannot purge itself too quickly of those who have not its interests as well as those of its patrons uppermost. How to do this without hurting others, however, is the great problem. Unfortunately, this is not likely to give any congressional committee much concern.

* * * *

Forty Years in the Saddle and Still Going Strong

FORTY years ago last Thursday Charles L. Edgar became associated with the Edison Electric Illuminating Company of Boston, organized two years earlier and operating a rather dilapidated-looking outfit housed in an old stable diagonally opposite the Hotel Touraine. Born near Menlo Park, N. J., and educated at Rutgers, the subject of this comment drifted to Boston as an inspector of the parent Edison company and has remained an adopted Yankee ever since. Now, forty years in the service of any company is a record to be proud of; but to have served the venerable and erudite city of Boston all that time, and to have grown with it, is indeed an achievement.

It is not our purpose at this time to eulogize Mr. Edgar, however, but to offer him our congratulations and the well wishes of the electric light and power industry, which has always admired and respected him and numbered him among its greatest leaders. The Boston Edison company is fortunate to have its destiny guided by so sagacious and human a president, and the Commonwealth of Massachusetts can pride itself on possessing such an outstanding captain of industry at its eastern gate and metropolis.

* * * *

Uniformity in Type of Rate Is Needed

THE rate situation in the light and power industry is tending toward diversity instead of uniformity. This trend should give cause for thought by leaders of the industry because considerations of public policy in the utility business dictate uniformity in the type of rate used. There is no fundamental reason for lack of uniformity in type of rate, and there are many basic reasons for building a uniform rate system in a country consisting of networks of power lines operating under different ownerships and all under public regulation.

Revival of interest in electric rates is based on a desire to get more business. The objectives of all rate makers seem to be to collect the fixed charges without complication or in a plausible way and then to use the inducement element to bring about increased consumption. All parties advocate that rates should make money, but opinions differ as to the type of rate to use. Some favor cutting the top rate and continuing on a meter basis; others advocate the use of optional rates to attract new business, retaining old business on existing rates; still others favor the installation of block rates with or without an hours'-use-of-demand provision, and yet another group favors a service charge, either stated as such or included in the first few kilowatt-hours.

Granted that all these rates can be used and are used successfully, and granted that all them make money, the fact remains that it is not good public policy and not good business policy for the light and power utilities to promote diversity in types of rate. The national aspect of the situation seems to be neglected. Power customers and residential customers are in many cases not local to one utility. Factories in several states are owned by one management. People move about the country and erect new homes. Diversity in types of rate makes it necessary for utilities to do a multiple selling and educational job and complicates the bookkeeping of industry. Some of the proposed rate types are irritants to regulatory commissions and create a disturbance in political and public relations. Since there is nothing basic in the difference between rate systems, it would seem to be good business for the utilities to agree upon some one

type of rate for national use, and then each company would do well to develop its rate system toward the national standard.

* * * *

Pioneers and Standpatters

A NEW country tends to develop salesmen. The pioneer type of man is direct-acting, receptive to new ideas, optimistic and aggressive. He must be to survive. An old country tends to develop men who are creatures of habit, unaggressive, pessimistic and loath to adopt new ideas and new things. Tradition fills the atmosphere.

Business dullness in some sections of this country occurs because of these things. There is no reason for slackness and recession in industry and business over a period of years in any part of this marvelous country. Each section is blessed with material things, and if any section suffers depression, it is due to an unnecessary depreciation in the human asset. A recent visit to a small town in a certain section brought before the visitor a situation typical of the older communities. Two large industries had moved away to another section of the country. The people in the community wailed, shook their heads and raised the taxes on the remaining industries so that the gross revenue of the town would remain the same. The utility executives were part and parcel of this community in their reactions—perhaps more bitter because they paid more taxes and yet their revenues decreased.

A visit to a newly settled but rapidly developing part of the country showed a different condition. Salesmen supported by the utilities, by the railroads, by the towns in the region were out working in all sections of the country. They all told the same story: "Come to us. We will give you a plant site; we will remit taxes for a few years; we will invest our money in your business and help you get money; we will give you a good power rate; we have splendid labor; our country is coming by leaps and bounds. Come with us and grow up with us." Is it any wonder such men bring new industries to their territories and even take old industries away from regions similar to the first mentioned? Attitude of mind is a selling asset.

* * * *

Fire Protection as an Art

FOR many years the chief interest of the electrical man in fire protection was based on reduced insurance rates. The prominent location of a few small extinguishers was a gesture and not an act of faith. But conditions have changed and fire protection is an art which for economic reasons deserves the serious study of electrical men. Service must not be interrupted; equipments are in large and costly units; oil is used in enormous quantities which create increased fire hazards. These changed conditions warrant a study of fire protection and an investment for that purpose far greater than would be dictated by insurance rates or insurance rules.

Modern fire protection means more than the use of small portable fire extinguishers or a dozen fruit jars filled with chemicals. It means a complete engineering design of a power station and substation in which principles of design and construction are used that insure isolation, drainage of oil, compartmental separation and inclosure of apparatus and, in addition, a fire-fighting installation adequate to put out fires without injury to employees. Recent practice is to use completely inclosed generators with a circulatory cooling system into which inert gases in large quantities may be introduced in the event of fire. In some metropolitan substations all oil-filled equipment is placed in compartments equipped with permanent piping for the introduction of chemicals. In outdoor substations portable extinguishers of many gallons capacity are used, and designers include pits, curbs and drainage systems to get oil out of the way of flames. More consideration should be given the fire hazard on many properties, because modern and adequate methods of fire protection pay returns by improving service standards and by preventing the loss of apparatus.

* * * *

The Awakening Electrical Market in Europe

AMERICAN electrical manufacturers have been accustomed to look upon the markets of Great Britain and the European Continent as an impossible field for any large exportation of our products, because of the comparatively low standards and prices prevailing in European practice. But American electrical men have always been inclined to think backward in considering the ultimate market. They have done this naturally because the electrical industry itself was built backward, starting as it did with large-scale manufacture and distribution of electricity before there ever was a popular demand or consumption. Now times are changing. We are knee-deep in the beginning of an era of intensive market development, and we are coming to see that the great objective is to first establish energy-using appliances in the homes and the lives of the people. This done, the sale of wiring material, transmission equipment and generating apparatus follows of necessity, and commercial and industrial dependence upon electricity increases by common acceptance.

Times are now changing in Europe also. England, traditional stronghold of the perfect domestic servant, has become possessed of a vexing servant problem. Even middle-class Britain today is asking where to get help, and the British housewife like her American sister is turning to electrical labor-saving appliances for relief, since the Great War called the household servants out of the kitchen into the factory. Likewise in Germany there is at present both a servant shortage and a housing crises. As a result many thousands of families whose chief pride in the past was the thrift and industry of the hausfrau are today eating their meals largely in restaurants. Here again there is a growing interest and desire for electrical devices to lighten the burden of the housework.

This is the beginning of a trend that will ultimately effect all progressive and enlightened nations. And their eyes turn to America in this matter because of the ingenuity and quality of these domestic appliances we manufacture. They are costly to European minds. But here are men and women beset by economic stresses in their homes. How much of this market we capture will depend upon our ability to sense and to serve European needs. The time has come for us to take more the viewpoint of the merchant and build electrical markets both at home and abroad by devoting our energies first to selling to the people the things they want.

Coal Is Raw Material

THE basic trouble in the coal industry is that demand is less than production and that the industry has not been organized to fit into modern conditions. Coal is a basic raw material and should be incorporated into mass production only as a raw material. Iron ore in the steel industry is manufactured by its owners into many products which meet many market demands. It is not sold as a raw material. In a similar manner economic relief for the coal industry must come through the manufacture of coal.

Chemists and engineers have forecast clearly the technical trends which must be commercialized in the coal industry. The raw material must be manufactured into oils, chemicals, medicines, gases and coke. The byproducts must largely replace the raw coal for the purposes of power production and heating. Time will elapse before the coal industry changes from a horizontal to a vertical type of industry, from a somewhat crude technical status to one high in the technical scale, from a hand-to-mouth process of existence to a planned business based on market analysis and mass production. But the power industry awaits eagerly the development of the coal industry along the lines indicated. Temporary market conditions are favorable to coal buyers, but in the long run power must be produced from the byproducts of coal; and these byproducts should be cheaper and better than raw coal for the production of power. The recent affiliation of the Standard Oil Company of New Jersey with the German "Chemical Trust" to process coal is indicative of recognition by business executives of changed conditions in the industry.

* * * *

Competition in Guarantees

FROM time immemorial there has accompanied every barter, trade or sale an implied guarantee that the products are as represented. Modern industry follows the practice of giving and exacting a written guarantee covering a reasonable period. Such a guarantee is necessary since with the enormous volume of production some defects in manufacturing are inevitable.

Recently there has come into being a competition in guarantees that is introducing a new evil. The only effect is to lure the buyer into believing that he is getting more for his money than he is. Products carrying a long-term guarantee are not inherently better than similar products of reputable make. A manufacturer offering a long-term guarantee is not in any better position to make such an offer to the buyer than any of his competitors if they desire to saddle themselves with an uncalled-for burden. The practice of attempting to outdo a competitor on the question of length of guarantee is based on a fallacy. The buyer wants only a reasonable assurance of performance and a product free from mechanical defects. This desire can be satisfied with the usual standard form of guarantee without the necessity of any specially long term.

The tendency of the long-term guarantee is to place on the manufacturer the burden of many evils. Included are the costs of repair work arising from causes entirely beyond his control and not because of a defective product. In effect, the long-term guarantee has a further tendency to increase the price of a product by distributing individual maintenance costs over the entire buying public, and questions as to where the responsibility in case of trouble rests may easily cause strained relations between the manufacturer and the buyer through no fault of the manufacturer. Long-term guarantees further lead the buyer to wonder whether the period covered does not actually represent the entire life of the product.

The principle of the long-term guarantee is wrong. Any trade practice indulged in by one manufacturer and which would affect the industry adversely if universally applied is a method that fundamentally has no reason for existence. The long-term guarantee is demoralizing to the industry and burdens the manufacturer, for it incurs a contingent liability for which there is no necessity.

* * * *

Emotional Appeal in Residence Relighting Activity

THERE is increasing evidence of a general awakening of lighting interest to the enormous possibilities in raising the standard in home lighting. For years new customers were added so rapidly that new business in new homes overshadowed the possibilities of additional revenue from old homes. A voice on that side has sometimes been raised, however, in these columns and elsewhere. Now a movement is on foot to combine into a co-operative activity the manufacturers, contractor-dealers and electric service companies. Plenty of data are available on all the phases of present wiring and lighting equipment. Experience is available from the national home-lighting activity conducted a few years ago largely under the auspices of the National Electric Light Association and also from a few outstanding relighting campaigns conducted chiefly by progressive commercial departments of electric service companies. Encouragement has come from all these avenues. The kitchen-lighting activity proves that a new standard can be established, for the millions of well-lighted kitchens now cause this new standard to sell easily.

But the problem of lighting the kitchen is simple and straightforward. The job is well done by a simple diffusing unit hung close to the ceiling, leaving only an auxiliary bracket or pendent diffusing-glass reflector at the sink to complete the job. In the other rooms of the home the problems are more complex, for they involve utility lighting effect and artistic appearance of the fixtures. Few are familiar with the subtleties of lighting effects. Taste is intangible, and individuals intrude their personal opinions into the matter. Too many available fixtures are dominantly ornamental without providing diffused, shaded and controlled light.

In formulating sales approaches it is well to choose fixtures which combine artistic quality with proper lighting. Then what will be the story? It should be remembered that facts must form the foundation and that logic provides the superstructure. But facts and logic are not enough for successful selling. They may indicate to the prospective purchaser that he should buy the new fixtures. But if he is to buy, then he must finally desire to do so. Emotional appeal creates this desire. Better home lighting must depend finally upon conservation of eyesight, greater convenience and comfort, a more charming interior, a higher standard of living and increased happiness. The possibilities of emotional appeal are very great, because lighting is essential to vision and most of our happiness and usefulness depends upon the doorway of vision.

Power and Irrigation Development at American Falls

AMERICAN Falls, on the Snake River in southeastern Idaho, has been the scene of great construction activity during the past two years. Here the government has recently completed a concrete dam 5,227 ft. in length and 83 ft. high at its highest point, and by this dam there has been formed an irrigation reservoir 25 miles in length and having 1,700,000 acre-ft. storage. Construction work made it necessary to move the town of American Falls to higher ground and raise the railroad bridge of the Oregon Short Line Railroad 22 ft.

Impairment of usage of full water rights held by the Idaho Power Company by the construction of the government's storage reservoir has necessitated the construction of an 81-mile, 132,000-volt tie line between the American Falls plant and other hydro-electric plants operated by the company lower down on the Snake River to make up for the deficiency in output of the American Falls plant during the storage season. Another 132,000-volt line from American Falls to the Wheelon plant of the Utah Power & Light Company will permit interchange of power between the two properties. Carrier-current communication will be installed on both lines for use in the normal operation of the transmission system.

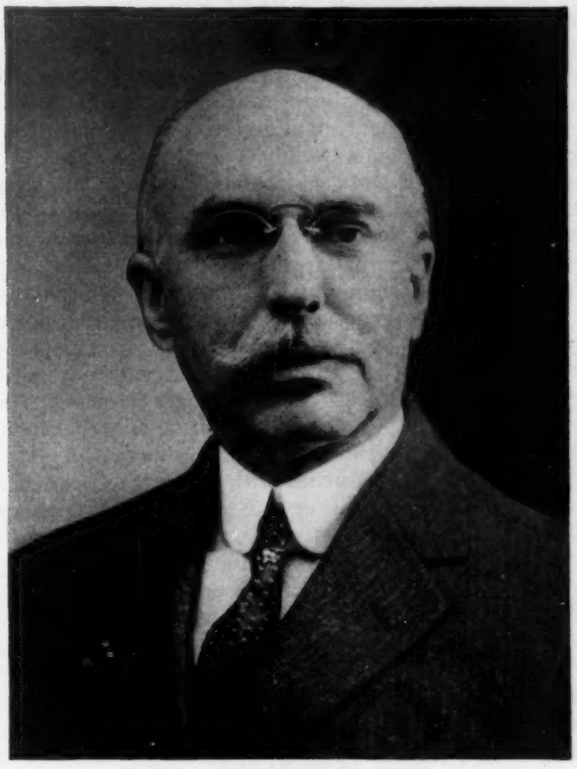
The illustration shows a portion of American Falls Dam built by the U. S. Bureau of Reclamation.

Sound Financing Follows Era of Experiment

Early power and light executives were frequently obliged to follow trial-and-error methods in raising new capital. Sound principles evolved

By WILLIAM S. BARSTOW
President W. S. Barstow & Company

Retrospection at times throws light on existing conditions and problems. Few are better equipped to indulge in reminiscence on yesterday's problems in the utility industry than Mr. Barstow, who here reviews some of the pitfalls from which the industry has emerged to financial stability and public confidence.



WILLIAM S. BARSTOW

IN THE early days the public utility executive was busy with problems of service and development of the art, and the securing of capital was left in other hands. At the start of the industry no one clearly visualized the future. The banker, who is the distributing system through which securities pass from the company to the public, did not create a financial structure suited to the unexpectedly rapid expansion of the physical structure.

The early financial structure of the power and light companies, like that of the railroads, was made up of borrowed money which paid for erecting the physical property. The lender, as an inducement to offset the risk of his loan, received an interest or partnership in the enterprise. This was then a legitimate transaction, when the promoter was a recognized and necessary factor in starting the business. If the business succeeded, the lender received a return on his loan represented by bonds and a further return on his partnership represented by stocks. If the business failed, he lost his partnership and generally the greater part of his loan.

These were the days when transcontinental railroads, owing to the uncertainty of financial success, not only recognized the promoters—or, as a friend of mine described it, "the gentlemen who do the necessary preliminary lying to get the cold-blooded public interested"—but were subsidized by the government through "land grants." This was necessary in order to attract the necessary capital for this railroad pioneering. In the case of electric public utility companies the inventors of essential parts of systems capitalized royalties on patents by taking stock and becoming partners. As the public utility developed and its service passed from the class of luxury to that of necessity, it was no longer necessary to give these early inducements to capital, and slowly, over a period of about forty years, the industry passed from a speculative to an investment basis, where it is today.

Now, there are two groups of investors—those who cannot afford to take a risk on return but must have a steady and sure income, and those who can afford to take a risk for a higher income. In the first group is the bondholder and in the second group the partner or stockholder.

The limiting of the principal of the mortgage at the outset brought endless trouble to the stockholder, for when a business depression occurred the capital necessary to meet the demands of the extensions to serve the public could not always be obtained from stockholders and it became necessary to use the earnings of the company which would otherwise be devoted to dividends to pay for these extensions. This use of cash from earnings required that dividends be temporarily suspended until business conditions returned to normal.

Now, it is a recognized fact that the earnings of a public utility company as applied to dividends are never sufficient to take care of the entire cost of new extensions. As the mortgage was closed as to amount, however, the company could not borrow further under it, so that second mortgages or temporary loans were resorted to and usually at high rates. The issuing of these obligations ahead of the stockholders' investment weakened the position of the stockholder and made him apprehensive of his loss of principal, and this often occurred through a receivership or reorganization. Now any stockholder who has lost his income, and finally all, or even part, of his principal, is not inclined to repeat the experience or to advise his friends to follow his example in investing. These situations continually occurred up to about 25 years ago and resulted in unsettled conditions of public utility financing.

About twelve years ago we took over a situation which illustrates the serious position in which a public utility can be placed and which was started by a closed mortgage. I refer to the Pennsylvania Utility Company, now the Pennsylvania Edison Company and an important part of a large system. When we took it over at the urgent request of all security holders and several bondholders whose interest had not been earned, the company having been obliged during the previous year to borrow the amount of the interest, a receivership under the conditions was only a matter of time. We found that the company had outstanding first mortgage bonds, second mortgage bonds, third mortgage bonds, secured notes of three series, unsecured notes in four series, floating debt, first preferred stock, second preferred stock and common stock, and that a large part of the important generating apparatus of the power plants was leased by the manufacturers. Incidentally, the company now has an open 5 per cent first mortgage and common stock. The bonds are quoted at 108, the stock pays 8 per cent, and not a single security holder lost a dollar of his original investment.

After the early experience with a mortgage closed at the outset, a number of crystal-globe gazers appeared and suggested that all that was necessary to correct the closed mortgage situation was to allow in the mortgage for an extra amount of loan beyond the amount at the outset, and that this extra amount could be used during the next twenty, thirty or forty years to take care of 80 per cent of the cost of all added physical property, and that after the extra amount had been used then the mortgage would be closed.

Guesses as to Future Needs

So the prophets became busy and guesses were made on the future needs of the electrical industry for the next twenty, thirty or forty years. But in almost every case the guesses were so far wrong that the mortgage became closed at the end of five, six or seven years, and original troubles returned. Very often the entire loan under the mortgage was retired at a high premium and a fresh start made, the experience being repeated to the gratification of the bondholder, who received the premium, and the discouragement of the stockholder, who in effect paid the premium. But this was not all. As general interest rates vary from 3½ to 8 per cent, and as the interest rate on all bonds whenever issued was fixed in the mortgage at one rate, conforming with the interest rate on money at the time the mortgage was made, there was a continual readjustment of price to adjust the rate of return. This affected the amount of cash received by the company from its bonds and resulted in uneconomical financing. During the war it was virtually impossible to sell a first mortgage bond carrying a coupon rate of 5 per cent except at a prohibitive discount. This resulted in a number of makeshifts being adopted in order to save the situation, such as adding to existing coupons an additional interest coupon on all outstanding bonds, in order to sell bonds. It was a problem exactly similar to that of coal; but in the case of the price of coal a way of adjustment was found through a coal clause, whereas in the case of interest rates no plan of flexible adjustment was available, although the two costs are of equal importance as they are factors in the total cost of the energy.

Several years ago a form of mortgage was designed, through the combined efforts of the leading bankers and public utility executives, which virtually solves the problem and is in general use today. A serial mortgage is created under which bonds can be issued in series, the issuing of all bonds, however, protected by safeguards such as value of property, earnings, etc. As all bonds of the mortgage are an equal lien on the property, they are all on the same lien basis, independent of what series they were issued under. But the interest rate, maturity and the other important essentials of any series can, however, be fixed at the time the series is issued by the stockholders through their board of directors and in the manner decided to be best suited to market conditions at the time. This places in the control of the company the determination of all important details of debt, and, as has always been the case, the details in issuing stock. The bonds which can be issued under such a mortgage are only limited by the value of the physical property pledged under the mortgage. Thus, as the physical property expands the mortgage debt can be economically expanded to take care of it. This serial mortgage has the effect of safeguarding the position of the stockholder, as he no longer fears a closed mortgage with attending results.

Customer Sales Stabilized Market

An important factor contributing to the stabilizing of prices of stocks has been customer ownership, where stocks are bought for investment rather than speculation, and, incidentally but important, the customer public becomes acquainted with the investor's viewpoint. While the customer stockholder has been educated as he never was before in the problems of investment, his education has not imbued him with any sense of responsibility as to his investment. He will always look upon the public utility company as his trustee, responsible for his income in much the same way as he holds it responsible for his service. If the trustee fails in the trust, the customer investor, or in fact any investor, will never assume any part of the blame, although he invested his funds according to his own best judgment after full information had been given him. This is not a theory but a fact. The interest of the average stockholder is nil as long as he receives the dividend due him, but let that dividend once stop or be reduced and it will take years of hard effort to regain his confidence. Time and time again articles have been written and talks given urging the stockholder to become acquainted with the affairs of the company in which he has invested his savings, and almost every time a failure has resulted.

We might well say that this attitude of the stockholder shows the confidence that he has in the organization. This is true and it adds a responsibility to an organization which is no less important than the responsibility to serve the public with reliable service at reasonable rates.

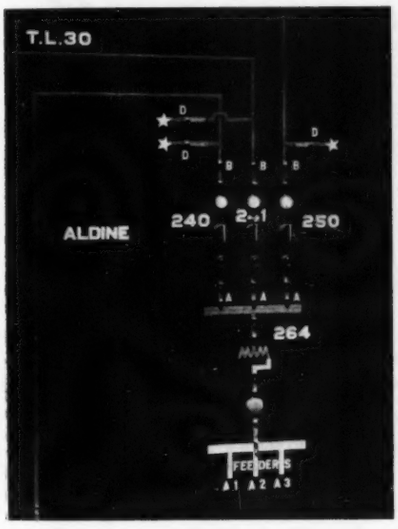
In all of this physical and financial structure, the accountant plays an important part. It is to him that the operating organization looks to guide its course of action. It is to him that the investor looks in determining his course of action. I am always especially interested in the way that the mind of the accountant works and the wonderful system that he has adopted to keep everyone in line.

An accountant is somewhat like a clock regulator. He governs the works properly in order to give the public the right time. Lack of appreciation of the accountant on the part of many small companies is the reason why small properties are disappearing as separate units and becoming parts of large organized systems.

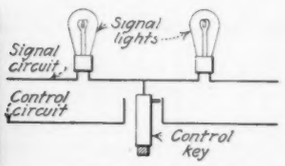
And now a few words about the holding company, or

investment trust, which for fifty years has proved itself of value in England and foreign countries in the stabilization of the prices of investment securities. We have had for many years such investment trusts in insurance companies, in which the policy holder takes the place of the stockholder. This plan simply carries out a diversification on the same principle as in electrical energy demand. An investment trust, or holding company, issues shares of stock or participation shares in a partnership and with the proceeds acquires the stocks of several operating companies which have a good continuous record as to dividends. These dividends from the operating company furnish an income in excess of the income paid on the holding-company securities. This excess is placed in a reserve. If now, owing to some condition arising which is beyond the control of the operating company, dividends from that company are temporarily suspended, the reserve is drawn on for this temporary period and the investor in the holding-company securities continues to receive his regular return. The value of this holding-company investment trust was demonstrated during the war period, where strong companies in effect carried the weaker ones without loss to investors. It was this demonstration that hastened the spreading of the plan of the holding-company investment trust, although holding companies had been in existence for many years prior to the war. As the holding company acquires large blocks of securities for a more or less permanent investment, the entire market for those securities is stabilized and opportunities for speculation are reduced. But with the good must come a certain amount of the bad, and unless the holding company or investment trust is properly safeguarded and directed by an honest organization equipped with unimpeachable accountants, serious harm will unquestionably result.

We have in the past forty years seen an industry develop from a small beginning and become an indispensable factor in the progress of the world, contributing in a marked degree to the growth of many other industries of importance. We have through team work secured for the electric public utility a wonderful physical and financial structure for its future development. As the industry expands added responsibilites must be assumed if we are to preserve service to the investor and the consuming public. There are as many hard problems ahead of us as there are behind us, but the encouragement of accomplishment should enable us to meet the problems of the future with a light heart.



AT LEFT, TYPICAL SECTION OF THE BOARD

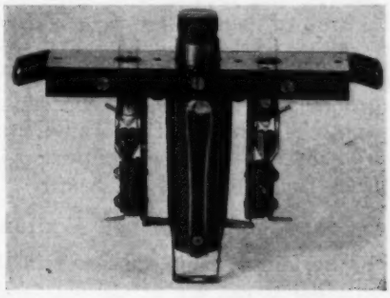


DEVICE FOR LOCKING "DISCONNECTS" IN CLOSED POSITION

Load-Dispatching, Remote-Control Board

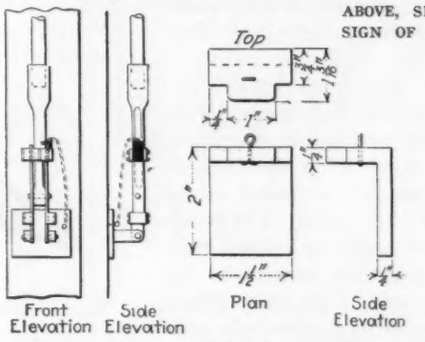
By Robert Reinbold
Chief Electrician
St. Paul Division, Northern States Power Company

A NEW load-dispatching board has recently been put in service on the St. Paul division of the Northern States Power Company. It is connected for remote control of circuit breakers on the connecting lines of eight substations having one to three breakers per station. Each breaker is protected by directional relays for selective operation to disconnect faulty lines automatically. These stations are non-attended, and they range in kva. capacity from 1,800 to 10,000, totaling 42,000 kva. The distance to the station farthest from the dispatching board is 7 miles. Each station has at least two connecting 13,200-volt lines. Since these tie lines are the only connections the substations have to the energy supply, the control of the tie-line switches at the substations is of great importance, and it is therefore imperative that such switches be arranged to be operated with the least possible delay. This is accomplished in the new board to a high degree, owing to the unusual combination of the dispatcher's schematic diagram, supervisory signal and remote-control board. The dispatcher's remote-control keys and signal lights are so placed on the diagram that they represent the switches at the distant stations which they control.



ABOVE, SPECIAL DESIGN OF KEY UNIT

BELOW, SCHEMATIC DIAGRAM OF CONNECTIONS



By this arrangement the dispatcher has the system diagram and the remote-control always before him and may see at once, in case of an interruption, how and to what extent the system is affected, what stations are involved and the action to be taken, and check the operation he is about to perform. In connection with the dispatcher's board is the private telephone system switchboard through which the dispatcher is in direct communication with any station. Placed above the private telephone system switchboard and within reach of the dispatcher are alarm and signal devices which are arranged to indicate the opening and locking out of automatic reclosing circuit breakers and the station in which

the breaker is installed. These devices are mounted on a panel separate from the dispatcher's board and serve also as a check on the signal lights on the board.

An unusual feature in the board is synchronizing by remote control, using telephone signal lights. This has been found very satisfactory and is now being used on two 28-mile, 25-kva. transmission lines, connecting the Apple River hydro-electric station with the system at St. Paul. The switches through which the synchronizing is done are on the 4,000-volt side of two 1,500-kva. transformer banks, which are located about 2 miles from the dispatcher's board.

The board is 7 ft. 6 in. x 12 ft. 8 in. in size and is made up of satin finish "Celeron" panels ¼ in. x 15 in. x 19 in., mounted on 1¼-in. iron-pipe supports. The panels are held in position at the corners by studs and acorn nuts, making it possible to remove one panel without disturbing the others. All lines and symbols of the diagram on the face of the board are of colored and enameled strips, letters and figures of paper, the various colors indicating the voltage of the lines represented. Broken lines represent underground and full lines overhead transmission. The shades of colors were selected to gain the greatest contrast with the black background of the board.

Standard Telephone Equipment

The lamps, lamp caps and jacks, also terminal strips, are of standard telephone type. It was found necessary to make specially designed dispatcher's key units as nothing suitable could be found in standard types of telephone keys. The special type used is of very simple design and proof against accidental operation. The wiring is in conduit on the back of the board. The conduit is ended in the boxes inclosing the key units. The boxes are hinged and can easily be turned back to permit free access for repairs or inspection of the key units. By this method the wiring and key units are entirely concealed and protected.

Standard lead-sheathed telephone cable is used for remote-control lines connecting the stations to the board and for the private telephone lines, both overhead and underground. The control scheme is the well-known four-wire type in general use for remote control of switches in generating stations, but requiring the addition of special relays operating on a low current value on account of the small wire in the telephone cable. Energy for the control and signal systems is supplied by a 60-volt storage battery made up of ten 6-volt, 100-amp. radio batteries. The energy consumption of the system is small, the lights requiring about 0.05 amp. There are at present forty lights on the board. The control requires about 0.1 amp. momentarily for the special control relay. The battery is charged by a small rectifier operating on 240 volts alternating current. At each station is a 30-volt or 48-volt, 100 amp. storage battery to supply the energy for operation of switches.

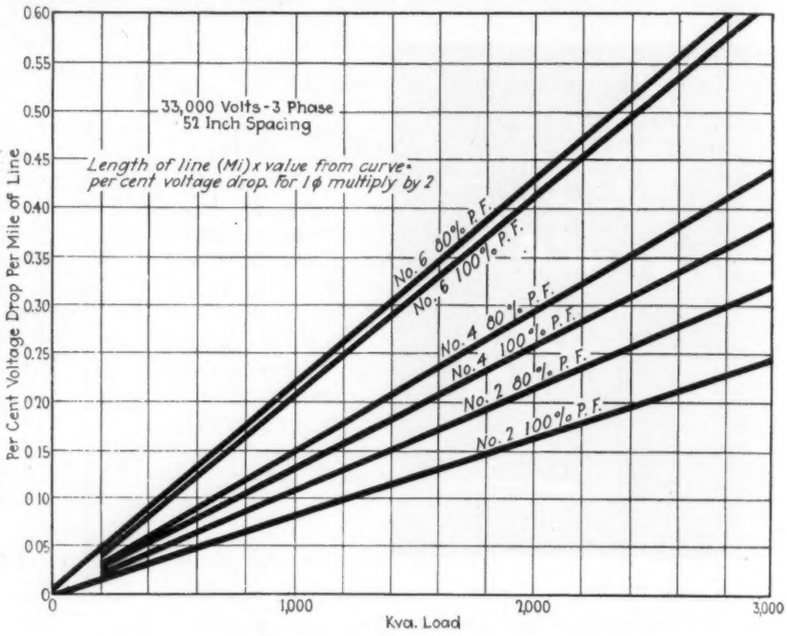
Operating reliability is the test to which this type of installation must be submitted and experience with the installation has been very satisfactory. The dispatchers learned to operate the board with little trouble and it has proved very reliable in service.

Plotting Data to Aid Transmission Line Calculations

By B. E. Ellsworth
Engineer Nebraska Gas & Electric Company
Lincoln, Neb.

ALL COMPANIES operating transmission lines are called upon to figure the service to be secured from transmission lines and the economics of these lines. The service given the purchaser may be expressed as regulation, or per cent voltage drop at full line load. One of the principal items in the economics of a given line is the power lost, which for convenience is represented in per cent of power delivered.

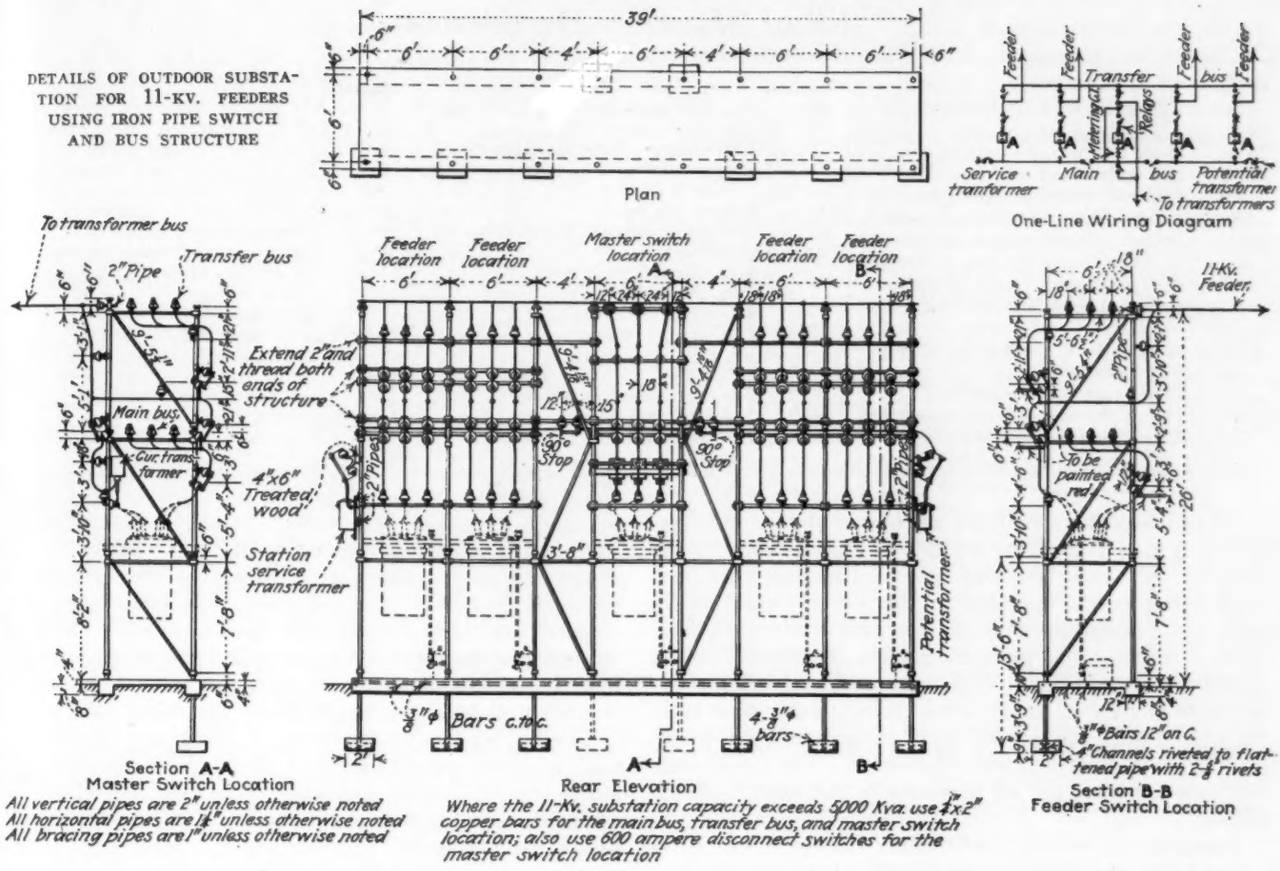
Every company has standards of construction in which, for a given voltage, the wire spacing is stated. With these constants in mind curves similar to those shown can easily be drawn up and will make transmission line calculation a simple matter and will eliminate errors from poorly designed calculators. These curves use load as the abscissa and per cent voltage drop per mile as the ordinate.



FORM IN WHICH REGULATION OF TRANSMISSION LINES CAN BE MADE READILY AVAILABLE

The use of such a curve is very simple. All that is necessary is to multiply the length of line, in miles, by the value given on the curve for the given constants (power factor, size of wire and kilovolt-ampere load) which are known. Per cent voltage drop for a single-phase circuit is double that of a three-phase circuit with the same constants.

The values for constructing these curves can be taken from a reliable calculator or from actual calculations. These two methods should check very closely. These curves may be drawn for voltages ranging from 2,200 to 66,000 without introducing serious errors. The results will be accurate for lines up to 100 miles in length. If desired, a similar family of curves may be drawn for per cent power lost in lines. These curves will also be straight lines. These curves can be made by any company for the spacing it uses in standard construction.


DETAILS OF OUTDOOR SUBSTATION FOR 11-KV. FEEDERS USING IRON PIPE SWITCH AND BUS STRUCTURE
Plan
One-Line Wiring Diagram
Feeder
Transfer bus
Metering
Relays
Service transformer
Main bus
Potential transformer
To transformers
To transformer bus
Transfer bus
2"Pipe
Main bus
Cur. trans. former
4"x6" Treated wood
Station service transformer
Extend 2" and thread both ends of structure
Feeder location
Master switch location
90° Stop
Potential transformer
Bars c.to c.
4-3/8"ϕ bars
11-Kv. Feeder
To be painted red
3/8"ϕ Bars 12" on C.
4" Channels riveted to flattened pipe with 2-3/8" rivets
Section A-A
Master Switch Location
All vertical pipes are 2" unless otherwise noted
All horizontal pipes are 1¼" unless otherwise noted
All bracing pipes are 1" unless otherwise noted
Rear Elevation
Where the 11-Kv. substation capacity exceeds 5000 Kva. use ¼"x2" copper bars for the main bus, transfer bus, and master switch location; also use 600 ampere disconnect switches for the master switch location
Section B-B
Feeder Switch Location

Inexpensive 11-Kv. Outdoor Substation

Easily assembled pipe construction reduces cost and adds to flexibility. Equipment costs range from $1.75 to $2.25 per kilovolt-ampere for 4,000-kva. to 5,000-kva. substations

By C. E. SCHNELL

Designing Electrical Engineer
San Joaquin Light & Power Corporation, Fresno, Cal.

IN AN effort to meet requirements for substations having oil circuit breakers of large rupturing capacity and to meet the necessity of providing for future expansion, there has been developed and installed on the system of the San Joaquin Light & Power Corporation, Fresno, Cal., a type of outdoor, 11-kv. substation that is giving excellent service and that has much of merit to commend its use elsewhere. With the exception of a small building (16x16 ft.) to house the switchboard, relays, storage battery and telephone, this is a complete outdoor substation.

Designed to handle up to 10,000 kva. at 11,500 volts, the structure consists of a pipe rack built to accommodate one transformer or master switch and four feeder switches, with a double bus arrangement consisting of a main bus and a transfer bus. The rack is built with 6-ft. bays, which dimensions give ample clearances between phases of 18 in. and to ground of 12 in. Vertical members and one horizontal member where the lines strain off are 2-in. pipe, while the horizontal members are 1¼-in. pipe with 1-in. pipe used as braces. All pipes are held by standard pipe rack fittings, which greatly facilitates field construction. These fittings as well as the pipe are galvanized.

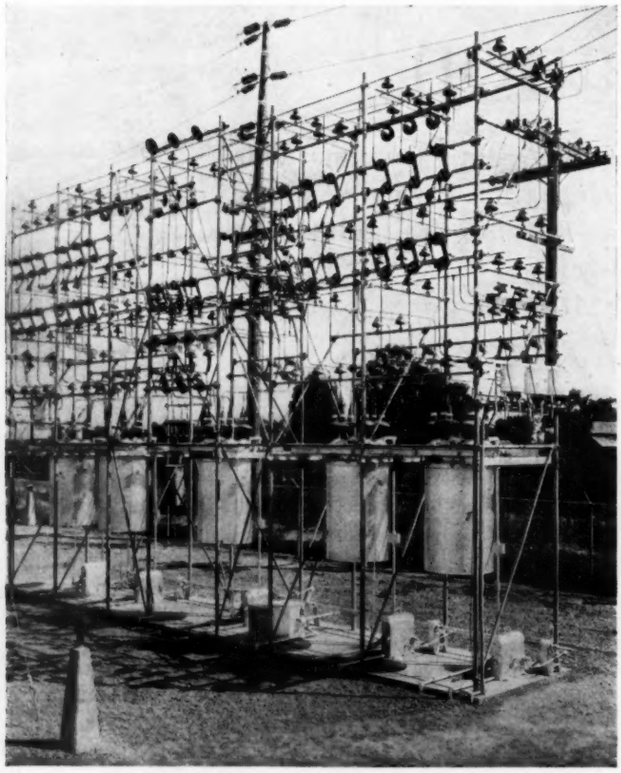
For substations where the capacitiy is not expected to exceed 5,000 kva., all buses and feeder jumpers are ⅜-in. pipe size copper tubing, and for capacities in excess of 5,000 kva., ¼x2-in. copper is used for main bus, transfer bus and master switch location. Experience has demonstrated that the ⅜-in. tubing is amply rigid over the 6-ft. spans, which is the maximum required with this type of construction.

Bill of Materials Description

Wanted		Wanted		Wanted	
	MASTER SWITCH LOCATION	39	No. 8300 galvanized insulator pins	2	2-in. galvanized pressed pipe caps
280 ft.	2-in. galvanized iron pipe	39	Tubing supports	2	2x2-in. galvanized clamp crosses
260 ft.	1¼-in. galvanized iron pipe	3	Underslung tubing supports	14	2x1¼-in. galvanized clamp crosses
220 ft.	1-in. galvanized iron pipe	5	22-kv. Pacific fuse supports and fuses	2	1¼x1¼-in. galvanized clamp crosses
8	2-in. galvanized pressed pipe caps	260 ft.	⅜-in. phase bars	8 ft.	4-in. black channel iron
12	2x2-in. clamp crosses, galvanized	15	Dossert connectors for ⅜-in. tubing	20	23-kv. pin-type insulators
44	2x1¼-in. clamp crosses, galvanized	3 cu.yd.	Concrete mix	9	15-kv. pin-type insulators
14	1¼x1¼-in. clamp crosses, galvanized	32 ft.	4-in. channel iron, black	8	2-in. galvanized clamp clevises
36	2-in. galvanized clamp clevises	7 ft.	4-in. channel iron, galvanized	17	Galvanized insulator pins
1	3-kva., 11,000-220/110-volt transformer	14 ft.	4x6-in. oil-treated wood	17	Tubing supports
3	6,600/110-volt outdoor potential transformer	30 ft.	⅜-in. copper tubing	3	Underslung tubing supports
3	15-kv. current transformers		FEEDER SWITCH LOCATION	75 ft.	⅜-in. copper tubing
18	15-kv., 300-amp. disconnect switches	70 ft.	2-in. galvanized iron pipe	9	Dossert connectors for ½-in. tubing
42	23-kv. pin-type insulators	100 ft.	1¼-in. galvanized iron pipe	10 ft.	No. 00 stranded copper wire, bare
		30 ft.	1-in. galvanized iron pipe	10 ft.	⅜-in. phase bars
				1 cu.yd.	Concrete mix
				3	1¼-in. tap—2-in. run clamp tee

All the disconnect switches are of the underslung type, having a nominal rating of 23 kv. Reference to the drawing will show how this type of disconnect has been made more easily operable in the vertical position by placing the mounting pipes on opposite sides of the 2-in. vertical risers. This gives in effect a 30 deg. tilt to the switch at no additional cost and results in all disconnecting switches on the structure being of the same type. All disconnects are of 300-amp. capacity except where the station capacity exceeds 5,000 kva., when 600-amp. switches are used for all locations in the master switch section.

Potential and current transformers of the dry or compound filled type are used for metering and are mounted on the structure. A station service transformer of suitable size is hung on the end of the rack opposite the potential transformers. These transformers are protected by fuses mounted on a 4x6-in. treated wood arm because of trouble experienced with birds causing phase to ground faults when these fuses, as formerly, were mounted on a 4-in. channel iron. The potential transformers are 60 to 1 ratio and three in number, and the current transformers are of suitable ratio to give proper instrument and metering accuracy. The station output is measured by three single-phase watt-hour meters.



PIPE FRAME 11-KV. OUTDOOR SUBSTATION WITH ONE MASTER SWITCH AND FOUR FEEDER SWITCHES WITH AUTOMATIC RECLOSING EQUIPMENT

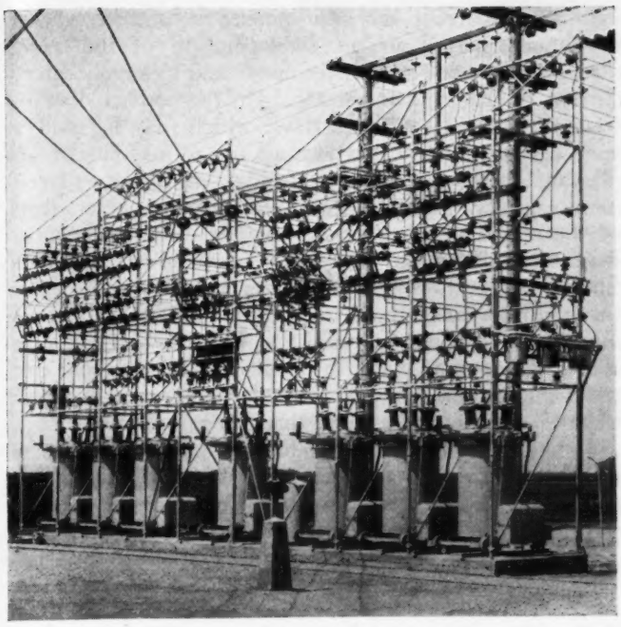
The height of this structure of 26 ft. is governed by the California requirements of 25-ft. clearance over and along streets, roads, highways or alleys, and the first span from this structure is usually to a getaway structure along a highway. The structure is designed to withstand a pull of 1,000 lb. per feeder location.

For future extension to accommodate additional feeders all horizontal pipes on each end of the rack are extended 2 in. past the last fitting and threaded so that the proper number of bays can be added as necessary. This involves moving only the potential or station service transformers, depending upon which end the addition is made. These structures have been built to take up ten feeders and have also been built "L" shaped in order to give a better feeder getaway. Two master switches have also been installed.

Its style is adapted to the use of any of the outdoor type of switches of suitable voltage as well as the outdoor switch houses now on the market. Generally a 15,000-volt, 300-amp. oil switch having six breaks per phase is used, all phases being in the same tank and separated by suitable barriers. The tanks are 36 in. in diameter by 5 ft. high, the switch being 7 ft. high over the bushings. Bypass disconnecting switches permit taking the oil switch from the circuit for inspection.

Two schemes for switch inspection are used. The most common is the suspended type, in which the tank is lowered by means of a small differential block on each side. By this method the switch is actually inspected in place and connected to its own operating mechanism. Another scheme is to mount the switches on four-wheel trucks, as shown in one of the illustrations, in order that they may be rolled on the transfer car and the whole pushed into the substation building for inspection and repairs. Here a set of chain blocks is installed over a pit so that the switch is lowered into the pit and the mechanism then lifted from the tank. This feature removes one great objection to the outdoor substation in that, no matter what the weather, the switches may be inspected as necessary.

These circuit breakers are equipped with bushing-type



PIPE FRAME SUBSTATION WITH SWITCHES MOUNTED ON TRUCKS FOR INDOOR INSPECTION

current transformers, which energize induction-type overload relays for tripping, and in the truck-type breakers the secondary and control wires are so arranged that they are disconnected by clips when the switch is rolled out, and are connected up in the same way when the switch is replaced, which obviates the chance of a wrong connection of important control and metering wiring during inspection.

Most of these outdoor substations with large-capacity switches have been made automatically reclosing by the application of the gang-reclosing scheme of the Western Electro-Mechanical Company of Oakland, Cal. This has been applied to groups of four to six feeders, with each feeder independent both as to number of reclosures and time interval between reclosures. Such equipment has permitted construction of isolated substations where the salary of an operator and the cost of his cottage, etc., would have been prohibitive.

To provide proper illumination for switching, four floodlighting units are mounted on concrete pedestals near each corner of the structure. These lights are movable so that the beam may be directed to the point where the switching is to be done, avoiding any direct light into the operator's eyes and giving the effect of daylight illumination. This is far superior to mounting the lights high up on the structure, as was done in some of the earlier installations. These pedestals may be seen in one of the illustrations.

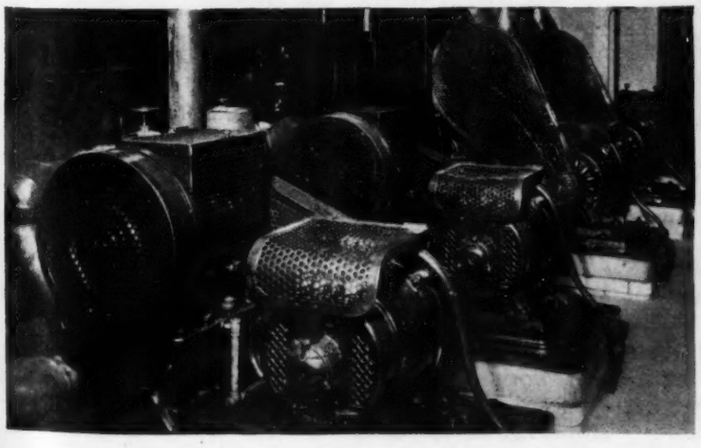
The cost of this type of substation may be easily determined by pricing the bill of material on the accompanying drawing. The cost of equipment will depend upon the type used and the purchasing power of the company. For stations on the San Joaquin system from 4,000 to 5,000-kva. capacity the cost ranges from $1.75 and $2.25 per kilovolt-ampere, which includes automatic reclosing equipment and everything but the cost of the main step-down transformer bank. Labor costs vary from $200 to $300 per master switch location and $100 to $150 per feeder switch location, so that the labor for a four-circuit structure will be $600 to $900.

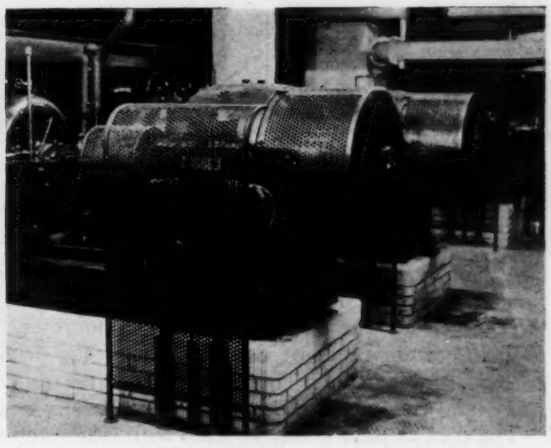
One desirable feature of this substation is that favorable prices may be obtained by outlining a year's construction program in advance and purchasing all material at one time. Quotations may be requested for all material required and deliveries arranged to suit the construction program. The savings made in this way more than offset interest charges on material that must be held in stock and, moreover, costly delays are avoided.

During nearly four years' experience with this type of substation on the San Joaquin system its reliability and value from both a construction and an operating viewpoint have been demonstrated. Plans call for several additional stations this year.

Screened Motors and Drives Avoid Accidental Contact

COMPLETE ventilation is secured by the use of screens and perforated plates of the proper shape to cover terminals and moving parts in both chain and direct-coupled shaft drives. The housings and mountings of the screens are designed to facilitate their rapid removal and replacement during inspection and repair periods. Corners of angle and pipe framing are rounded off to prevent abrasion of clothing and hands when working around the equipment. The use of iron conduit wiring gives excellent protection against damage by tools or machine parts during handling. In such an installation a crowbar or an employee might fall against the equipment without interrupting service.



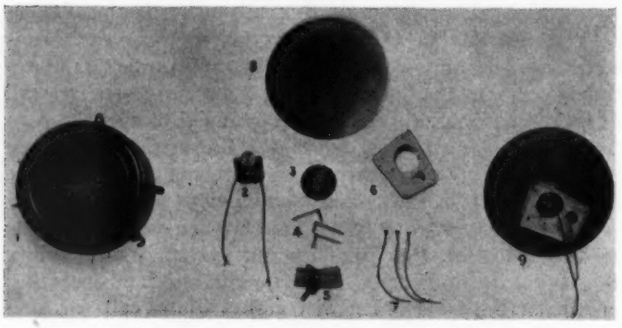


SAFETY PRECAUTIONS ARE PART OF A GOOD MOTOR INSTALLATION

Shop-Checking and Loading Demand Meters

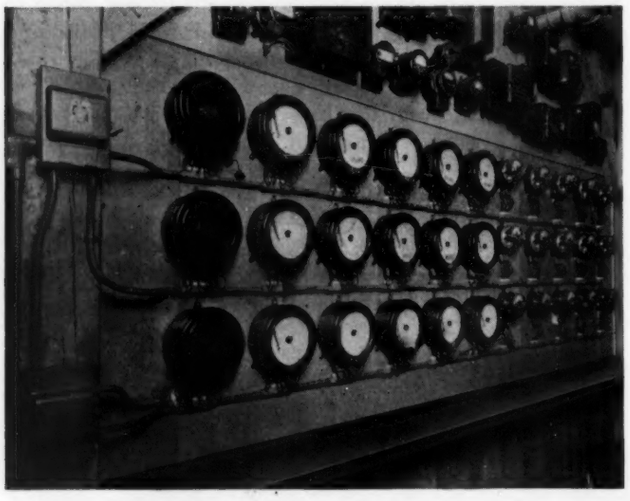
By W. B. Brown and G. M. Niemeyer
New Orleans Public Service, Inc.

DEMAND meters must be in operation at all times, whether installed on customer's premises or not. Experience shows that a demand meter will be more or less sluggish if not operated continuously for at least 200 hours before installation on the customer's premises. Various devices have been developed to take care of this situation, but all have certain disadvantages, mainly due to complicated and delicate mechanism, and in addition they consume a large amount of current, as loading devices are usually a part of the system.



CONTACT DEVICE FOR LABORATORY CHECK OF DEMAND METERS

1. Assembled device for use with alternating-current demand meters.
2. Warren motor.
3. Contact disk assembled.
4. Contact brushes with studs.
5. Condensers.
6. Mounting frame for Warren motor.
7. Contact brush leads.
8. Mounting panel for contact device.
9. Assembled contact device ready for mounting in case.



CONTACT DEVICE OPERATING DEMAND METERS IN LABORATORY

A rugged and economical device of simple construction was built to take care of this work. Accurate timing is obtained by the use of a Warren motor such as is used in certain types of demand meters for driving the contact mechanism. This motor operates at constant speed and the current consumed is practically negligible.

The contact device may be used with either alternating-current or direct-current demand meters. When used with direct-current demand meters, it is necessary to supply alternating-current for operation of the motor through a separate pair of terminals and to supply direct-current to the main terminals. On the contact disk are fourteen contact-making screws, which may be used to vary registration of the demand meter in steps of approximately 14 per cent of capacity. In using a fifteen-minute interval, 100-division scale demand meter, three of the contact-making screws are set up on the contact device. This should indicate a demand of 45 units. Should registration be less than 45, it will indicate either that the interval of the demand meter is less than fifteen minutes and should be readjusted or that there is a defect in the demand meter mechanism such as a loose electrical connection, bent gear, etc. If registration is greater than 45, the interval is more than fifteen minutes.

It has been found practicable to operate ten demand meters with one contact device. This necessitates the use of suitable condensers across the contacts to prevent pitting of the segments on the disk.

A Constructive Suggestion in Standardization

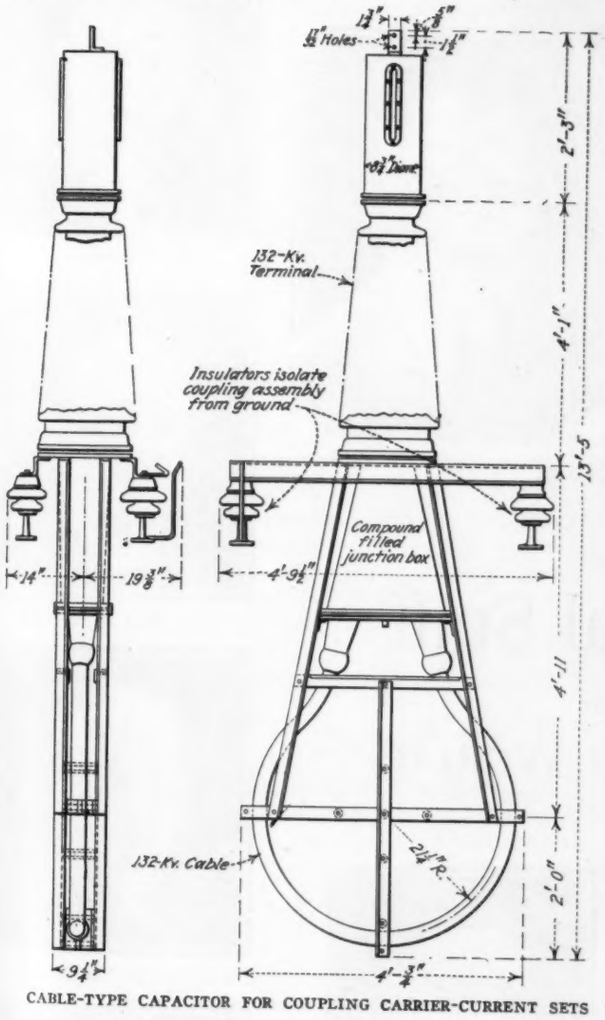
By Joseph Sachs
Chief Engineer Electrical Division, Colts Patent Fire Arms Manufacturing Company

IN AN article published in the August 20 issue of Electrical World certain comments about standardization relations between utilities and electrical manufacturers were made. It is intended that these comments be constructive as well as critical and this purpose would not be attained without suggesting some set-up of standardization machinery and procedure whereby such specific problems as were instanced in the previous article, and others of a similar character may be investigated, clarified and analyzed and the diversified practices unified into a common form acceptable and usable by all. Definitely established and properly operating co-ordinating and correlating means for bringing together these two great electric groups—N.E.L.A. and N.E.M.A.—in their mutually desired and much needed standardization work are not apparent, if they exist. Perhaps the internal standardization structure already established by N.E.M.A., having at least the advantage of some trial and with fairly satisfactory results, may embody features worthy of note and consideration by the other organization.

The organization structure of N.E.M.A. includes four divisions: policies, supply, apparatus and radio; the last three of which are made up of sections, each comprising a group of companies manufacturing similar products. Each section functions for the consideration and treatment of the mutual problems encountered in connection with a definite class of apparatus or appliances and includes in its work the inception and development of standards affecting or relating to the apparatus or appliances coming within the jurisdiction of that section. The standards committee (a standing committee) directs, reviews and approves the standardization work of the association, co-ordinates standards proposed by the several sections and suggests standardization development. It also serves in co-ordinating or correlating standardization work of mutual

interest with other organizations. Finally, after a proposed standard has passed approval of the sponsor and all other interested sections, the standards committee edits and takes proper procedure for authoritative approval and adoption by the association and its publication as an N.E.M.A. standard.

N.E.L.A. has its commercial and technical sections with committees for the consideration of various problems. Much of the work done has been in the nature of standardizing apparatus and appliances as well as practices. However, it appears that the N.E.L.A. structure does not embody quite as complete correlationship and co-ordination between the various committees and their work as has been established in the manufacturers' association. N.E.L.A. needs a standards committee, functioning in connection with N.E.L.A.'s standardization work similarly to N.E.M.A.'s standards committee.



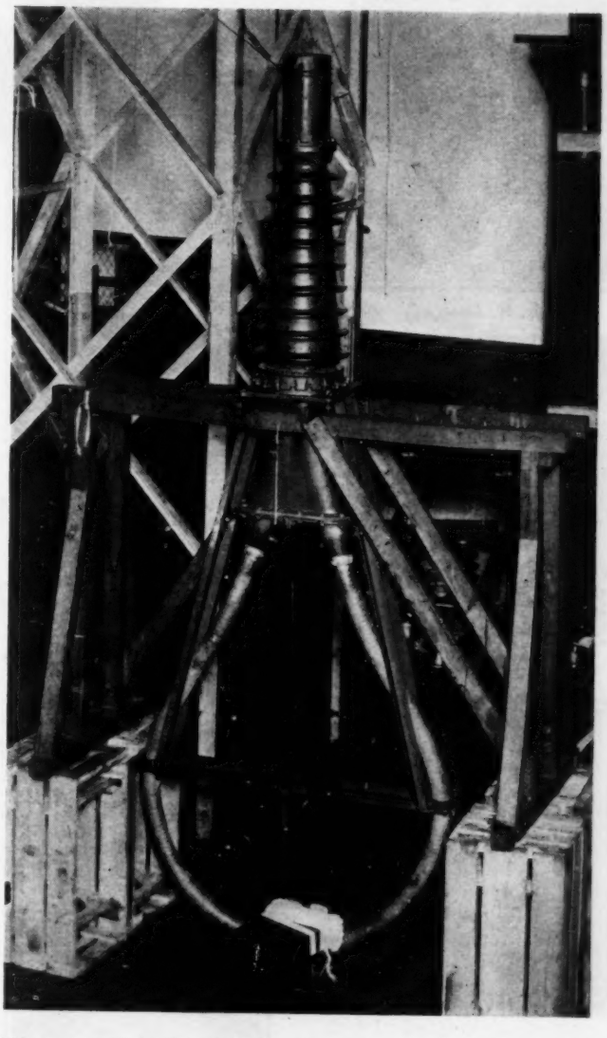
CABLE-TYPE CAPACITOR FOR COUPLING CARRIER-CURRENT SETS TO 110-KV. CIRCUIT, AND SOME DETAILS OF CABLE-TYPE CAPACITOR

With each association provided with a general standards commitee, functioning as indicated, a logical and probably beneficial further thought would be to operate through a standards clearing body comprised of proper representation from both associations. The first step appears to be of immediate importance. Any development that will substitute commonly used uniformity for present existing diversity will be most welcome to the manufacturer and substantially benefit the utility.

EDITOR'S NOTE:—Because of a lost galley the material in this article was unintentionally omitted from the article previously published.

New Type of Carrier-Current Coupling

CAPACITORS of a relatively inexpensive and ingenious design will soon be installed by the American Gas & Electric Company for coupling its carrier-current communication circuits with the 132-kv. transmission lines of its operating companies in Indiana, Ohio, West Virginia and Tennessee. The coupling employs a short loop of 132-kv. cable, the ends of which connect inside an oil-filled compartment with a 132-kv. outdoor terminal, and the sheath connects with the carrier-current sending or receiving set. The capacitor can be



mounted on a crossarm below the high-tension conductor, to which the terminal may be connected with a jumper. For protection purposes a 1-in. horn gap is used to shunt the assembly-supporting insulators. The unit shown in the General Electric laboratory has a capacity of 0.0013 microfarad and is designed for use on a 110-kv. system. The one shown in the line drawing is designed for 132-kv. and 0.001 microfarad. This device is expected to allow a marked reduction in the amount of power needed for carrier-current communication (compared with antenna coupling) and also a reduction in the initial cost of the coupling equipment.

T. P. KINDIG

L. W. W. MORROW

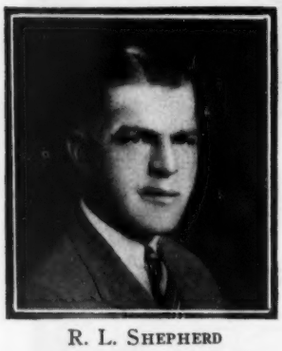
In oval
W. H. ONKEN, JR.

A. M. PERRY

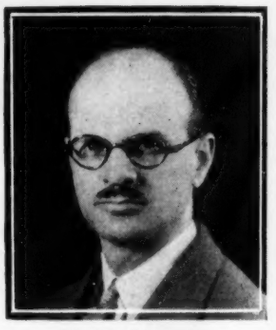
W. C. HESTON

F. R. INNES

G. F. WITTIG



R. L. SHEPHERD



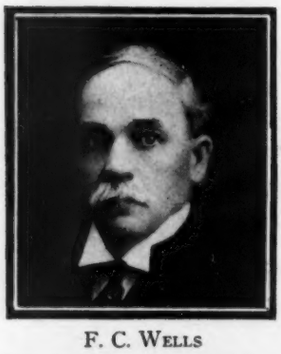
H. M. CAMERON

The

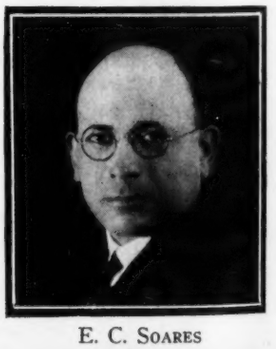
Editorial Staff

of the

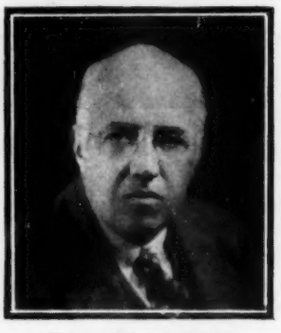
ELECTRICAL WORLD



F. C. WELLS



E. C. SOARES



EARL WHITEHORNE

H. S. KNOWLTON

E. R. SEARLES

L. H. CHURCH

A Bow Before the Curtain

WITH this issue the ELECTRICAL WORLD is presented to its readers in a new typographical dress and with rearranged contents. The new body type, with "old-style" face, was chosen because of its legibility and beauty. The contents have been regrouped, and henceforth long and short staff and contributed articles of a technical, industrial, financial or commercial nature will form the first unit of the paper, while items of news, with an immediate time value, will, whatever their nature, form the second and only other unit. Thus division into too many departments, with the pigeonhole effect of an old-fashioned desk, will be avoided, and greater continuity of text and flexibility of make-up will be attained.

Our New Make-up

It is the conviction of the editors that the new typography and arrangement will display the contents to better advantage, improve the appearance of the pages, and make not only a more readable magazine, but one more likely to be read through; for it is the editorial ideal to produce a paper all the material in which will appeal to every reader who desires to keep abreast of the accomplishments, the tendencies and the thought of the industry. The number of pages, the relative length of articles with respect to their importance and interest, and the proportional allotment of space to the different features embraced in each week's issue, will remain as before. In this regard there has been no change in editorial practice.

THIS alteration in appearance has not been undertaken lightly, but is the result of long and careful consideration. Caprice or arbitrary change has no place in fixing the course of the ELECTRICAL WORLD, which, time-honored and imbued with a sense of responsibility, has been given the friendship and co-operation of a host of readers for more than half a century.

Old Standards Remain

Under a succession of able editors in the past, the policies of the paper have been based solely on unselfish service to the industry. Guided by them, the ELECTRICAL WORLD, through all the marvelous developments of the industry and the art, has been eminent in accomplishment and leadership. Always it has adapted itself to changed conditions, but always it has preserved its characteristics of service, idealism, honesty, virility and independence. The editors were not content with tracing and recording the changes in the world of electricity; they analyzed achievements, comprehended tendencies, helped to develop growth and to direct progress. The good will and hearty co-operation of readers in all parts of the world were their reward, and these readers and friends made the publication what it was and is.

To maintain these high standards unblemished, to preserve the traditions their predecessors have handed down, to strive their utmost to add to the record and to win new laurels for the ELECTRICAL WORLD, are the objects the present editorial staff has always before it.

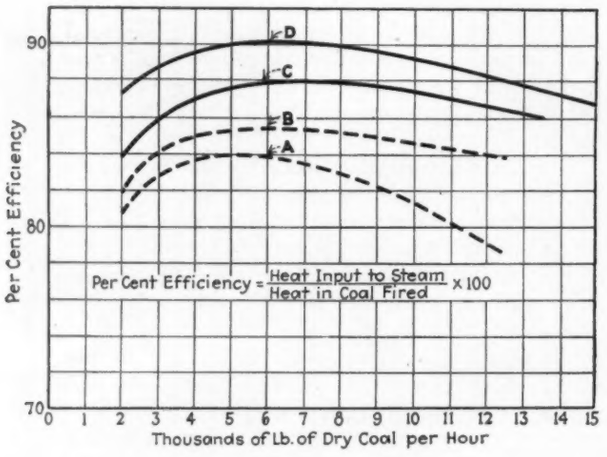
EDITORS may come and editors may go, but the ELECTRICAL WORLD goes on. To the fifty-three years that stretch behind it many generations are likely to be added. The ELECTRICAL WORLD is an institution. Its editors at any period are but transient tenants who, with a keen realization of their obligations, can "do their bit" unstintedly and loyally, but can make only one hour of editorial history. In that brief hour they would, were it possible, meet and know all the contemporary friends of the periodical they edit, talk with them about the industry's problems, exchange opinions, discuss suggestions and listen to criticisms. With more than nineteen thousand subscribers and a far greater circle of readers, this is manifestly an impossibility. But, as a friendly gesture, the editors have for this week only laid aside their modesty—habitual, they hope—and in counterfeit presentment, on the opposite page, obtruded themselves upon their supporters. They seek no applause, but, conscious of doing their best, they greet the reader.

Meet the Editors

Could contributing specialists, valued correspondents and deft and practical assistants be added to the executive and specialized editors at the home office and the all-around editors in territorial headquarters, the group would be much larger. This the dimensions of the pictorial page forbid; but the selected representatives make their bow, thank their readers, and withdraw again behind the curtain formed by the white paper and black ink of the weekly issues.

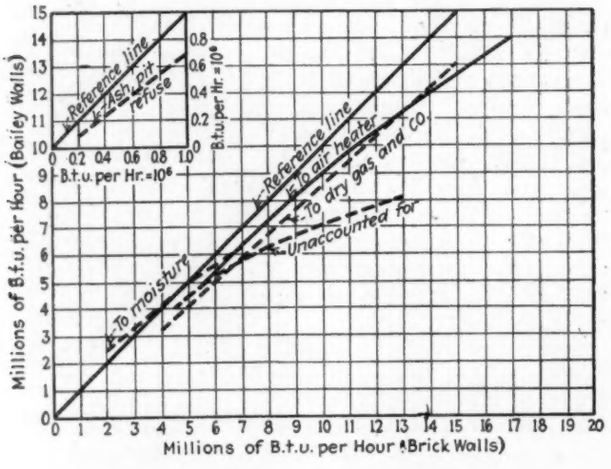
Water-Walled Furnaces Bring Benefits*

IMPROVED boiler efficiency, a reduction in the amount of combustible matter in ashpit refuse and soot and a better distribution of heat throughout the boiler are the major benefits realized by the Philadelphia Electric Company in its installation of water-cooled boiler walls. Data recently made available indicate the experience this company has had with Bailey water-cooled sides and bridge walls.


Per Cent Efficiency
90
80
70
D
C
B
A
Per Cent Efficiency = Heat Input to Steam / Heat in Coal Fired x 100
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Thousands of Lb. of Dry Coal per Hour

BOILER EFFICIENCY CURVES

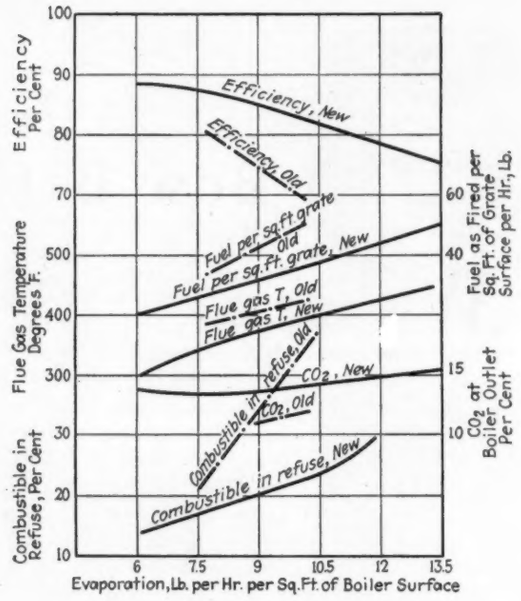
Curve *A* shows the efficiency of a refractory-lined boiler. Curve *B* is for the same boiler equipped with Bailey water-cooled walls. Curve *C* shows the efficiency of another boiler with refractory-lined walls. Curve *D* shows the efficiency of a boiler which is a duplicate of that shown in *C* except that the former has 40 per cent more economizer surface, 10 per cent more boiler-heating surface and 9 per cent more superheater surface. The indicated increase in efficiency of 2 per cent in *D* might be partly due to the increased boiler and superheater surface, but the larger part is reported due to the installation of the Bailey walls.



DISTRIBUTION OF HEAT THROUGH BOILER

The reduction in number of British thermal units unaccounted for when using water-cooled walls is clearly indicated by this figure.

Water-cooled surface amounting to 645 sq.ft. was installed in a boiler setting without any other alteration in design. The water-cooled wall surface amounted to 3.79 per cent of the boiler-heating surface, and an increase in capacity of 10 per cent was anticipated. The actual


Efficiency Per Cent
Flue Gas Temperature Degrees F.
Combustible in Refuse, Per Cent
Fuel as Fired per Sq. Ft. of Grate Surface per Hr., Lb.
CO₂ at Boiler Outlet Per Cent
Efficiency, New
Efficiency, Old
Fuel per sq. ft. grate, Old
Fuel per sq. ft. grate, New
Flue gas T, Old
Flue gas T, New
Combustible in refuse, Old
CO₂, New
CO₂, Old
Combustible in refuse, New
Evaporation, Lb. per Hr. per Sq. Ft. of Boiler Surface

BOILER PERFORMANCES COMPARED

Curves for four-pass Stirling boiler with refractory walls and for a three-pass Stirling boiler with water-cooled walls prepared from data compiled for the Saxton station, Day & Zimmermann, Inc.

absorption from these walls runs from 6 per cent of the total input to the furnace at low rating to 3 per cent at the high rating. This absorption, together with reduction in losses due to the walls and the use of a slightly longer stoker, has caused an increased rating of 10 per cent on 24 hours run and 20 per cent over shorter periods. Side-wall radiation losses have been cut down extensively. The bridge and side-wall maintenance has been reduced, refractory burnouts having been eliminated following the installation of these walls. The over-all economy of the boiler has been improved 2 per cent, due to a reduction in practically all losses.

Extracts from report of prime movers committee of the National Electric Light Association, June, 1927.

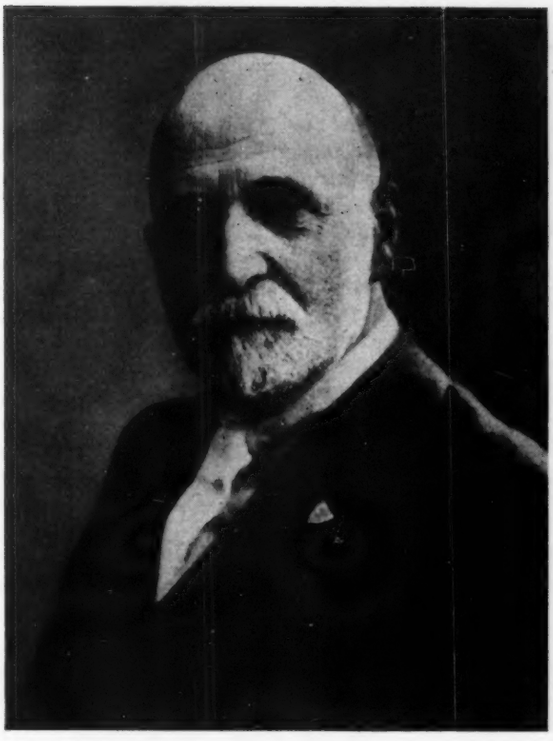
Tidal Power Stations in France

THE proposed tidal power stations in France were the subject of some discussion at the recent annual meeting of the French company L'Azote Francaise, which participates in the Société Technique d'Etudes et d'Entreprises pour l'Industrie, which has been preparing plans for the tidal station at Aber-Wrac'h in Finistere. In a speech delivered at the meeting the chairman of the Azote Francais reviewed at some length the history of efforts to utilize the tides and the technical problems involved. In reply to a shareholder who asked whether the Aber-Wrac'h station was simply an experimental station, or could be regarded as an industrial works, the chairman said that a plant of 6,000 kw. was more than an experimental station. Semi-industrial experiments had been made in order to study the value of the turbines, and their results allowed him to declare with certainty that the problem had been completely solved. The chairman went on to say that work at Aber-Wrac'h would begin in October and he hoped that in two years time they would be able to attend the inauguration of the station. He thought that there was no need to await the results of Aber-Wrac'h before starting similar stations abroad.

General Purpose
Secondary Circuits

Informal discussion of trends in development and comments on systems now in use. More experience is needed

By ALEX DOW
President The Detroit Edison Company



ALEX DOW

THE printing of my letter in the ELECTRICAL WORLD of March 12, 1927, has brought me a lot of personal correspondence. The correspondents who concur and the correspondents who protest are about the same in number. I have replied directly to each correspondent and with some I have exchanged several letters. Also I have had several talks on the subject with people interested. This writing is an arrangement and expansion of the letters and the palaver.

Some of my critics assume that I am making a comparison of merit between secondary networks, so-called, and radial secondaries, so-called; and that I favor the latter. I don't. My protest is against an ill-considered recommendation to the industry of a particular circuit—viz.: three-phase four-wire 115-119 volts—as a general substitute for existing secondary circuits of 115-230 volts, some of which are networks and some are radial; some single-phase and some polyphase. Whether these be networks or radial lines has nothing to do with the case.

My protest runs likewise against the assumption by some advocates of the 115-199-volt circuit, that they have or had a mandate to survey the evidence and hand down a decision. They seem to have made inquiries of the lampmakers as to possible lamp voltages, and been told that the present standards—110-115-120 volts—quite recently adopted, are not open to reconsideration. They certainly have discussed the subject with motor makers and presumably are assured of approval of a scheme which should make a market for new motors in place of old ones. They seem to have visited with the makers of network protectors and found much enthusiasm. They probably did not think it necessary to ask the makers of meters whether they would willingly sell two-element meters to replace single-element meters, and three-element meters to replace two-element meters. I certainly desire good trade for all my manufacturing friends: but I prefer to trade for things I really need. Also, I can see that these inquiries of manufacturers, if to be made at all, would have been made to better purpose by other negotiators. They are not inquiries as to engineering possibilities. They are inquiries as to commercial policies.

Let us premise that one general purpose secondary would be a desirable substitute for the separate lighting and power secondaries now commonly used. Its prima facie advantages are: fewer conductors on any frontage; the maximum use of copper in the retained conductors; fewer and larger transformers costing less per kilovolt-ampere and more efficient; better regulation for equal expenditure on regulating devices; optional metering by one meter per customer instead of separate meters for lighting and power. We have to recognize the universal use (in the United States and Canada) of the nominal 115-volt lamp (ranges 110-115-120) and the unwillingness of our industry, now just beginning to reap the commercial benefits of a recent standardization of lamp voltages, to reconsider that standard. We also must recognize the almost universal use of 220-volt (nominal) motors on central-station circuits, and the numerous and increasing connections of water heaters, ovens, and so on, at 230 volts, nominal. To exchange or rebuild all these motors, etc., or any large number of them, may mean paying too much for the stated advantages of a general purpose secondary. The problem then is to find some form of secondary circuit that will give the desired benefits without entailing costs or collateral disadvantages exceeding the benefits. It is not a question to be settled by comparisons of estimates of costs, or copper losses. Convenient operation, maintenance, and extension must not be impaired. Service to customers at least as good as now is a sine qua non. To require changes

in customers' equipment involves explanations, and superfluous explanations are unwelcome.

A first step toward a solution of the problem is to examine the divers secondaries now in use. The best and oldest of these is the Edison direct-current three-wire network, but direct current is barred by the premises. We everywhere find single-phase 115-230-volt secondaries extended and supplied so that they are real general purpose secondaries, subject to the limitations imposed by their single-phase character. There are, nevertheless, on such secondaries many thousands of 230-volt single-phase power motors and of heating devices and so on, supplied at 230 volts. We find in some large cities exceedingly important two-phase, five-wire networks giving good service. Their copper efficiency is high. They entail the use of the standard, although less common, two-phase motor.

There are three-wire three-phase secondaries, 230 volts delta, serving polyphase motors. Considered purely as distribution lines these secondaries are most efficient and cost least. It is, however, less usual to have an extended secondary of this character than to carry the primary high voltage circuit to local polyphase transformers for each job. An obvious objection is that 115-volt lamps cannot be connected directly to a 230-volt delta secondary—a difficulty non-existent in the five-wire, two-phase secondary and the ordinary three-wire single-phase secondary.

Network Advantages Not Proved

There is in use in several cities the four-wire, three-phase, secondary of 115-199 volts. Its advocates claim much for it. They say that it has a lesser distribution loss or (alternatively) that it requires less copper than any other form of secondary. This claim is not proved by the facts in the case. This four-wire circuit requires two-element and three-element meters where common practice now uses one-element or two-element meters. It gives too low voltage (199 volts) for standard motors, and heaters and so on, customarily connected to 230 volt outers.

I observe that at least 90 per cent (possibly 95 per cent) of the mileage of existing secondaries is in the single-phase three-wire class. The existing polyphase secondaries are important in terms of their capacity and in the character of the service connected to them. Nevertheless the conditions which are usefully met by these secondaries are limited and local while the conditions met by the single-phase, three-wire secondary (115-230 volts) are universal. The single-phase motor up to, say, 10 hp. has good running characteristics and good power factor. It can be improved and will be cheapened if and when the call for it increases. As to water heaters and bakers ovens, etc., which are usually connected across the outers on 115-230-volt single-phase, and domestic ranges usually connected three-wire—the service to these by the single-phase secondary cannot be bettered. Fractional horsepower motors are naturally connected at 115 volts to one side of a secondary, and they run as well as they are built to run, which is not saying much. Most of these motors now on our circuits are nuisances. Customers may and do tolerate the blinking of lights by their starting current, but the noise they make is a customers' grievance; their bad power factor is a grievance to our companies; and their interference with radio reception is a scandal alike to the customers who know these motors to be the offenders, and to the companies that have to placate radio fans complaining about "power leaks." If and when we get the long promised condenser-type fractional horsepower motors, which are to be free from these faults, the companies will be justified in seeking the abolishment of those inferior motors, and in refusal to tolerate their future connection.

As to distribution efficiencies—if (by assumption) the load is perfectly balanced in three parts (instead of in two) and if four wires (instead of three) are run on all branches and all services from the secondary (excepting very short two-wire services), the four-wire three-phase secondary is a more efficient distributor than the three-wire single-phase but no more efficient than the five-wire two-phase secondary. Under these stated conditions the use of the four-wire secondary might bring about a saving of one-half or one-third of 1 per cent of the total energy now delivered to single-phase secondary circuits. The saved energy would be energy which is produced at increment cost, and the reduction upon the total cost of service might need a special audit for proof. But in real service the loads on no secondary will be balanced. Two-wire branches or service connections will be equally efficient in the one case as the other, but if these are to be balanced in sets of three instead of by twos, there will be more current in the neutral.

Three-wire services at 115-199 volts become polyphase and require polyphase metering. They have 14 per cent less voltage across outers. The current flowing in the neutral and the lack of inductive balance will be adverse to regulation. These considerations imply that there will be excessive cost in the polyphase rearrangement of our existing three-wire service. To gain the higher efficiency of distribution on 90 per cent of our secondary mileage that mileage will have to be paralleled by an additional conductor. To present my statement in another way—it will continue to be cheaper to set up a polyphase transformer here and there to take care of an occasional polyphase load in a three-wire district, than to change the entire secondary in that district. Where there is a controlling proportion of polyphase load, the fourth wire will pay for itself, but that is not the frequent case.

Two Novel Systems Overlooked

Two novel secondaries seem to have been overlooked in this discussion. One of these is used successfully in Minneapolis. The 115-199 volt secondary is supplemented for motor service by small auto-transformers that provide the standard 230 volts at the motor terminals. This complicates the secondary and increases losses a little. It has comparative merit in that it requires no change of the customer's motors. It has the other faults of its type of circuit. The other novel secondary is successfully used in Detroit. It is developed from any existing single-phase, three-wire secondary, by providing (where needed but not elsewhere) a fourth wire (called, for short, the "phase wire") which is given phase and voltage such that standard three-phase motors can be connected to the outers of the existing single-phase secondary and to the added phase wire. The phase wire may be fed by T-connected transformers; or by two small transformers connected in a closed delta with the nearest single-phase transformer, or by one small transformer hitched in open delta to that transformer. The open delta method proves to have more merit than is at first apparent. The obvious objection to this Detroit secondary is that it does not have polyphase balance. But why should it? providing it gives good service without extravagant copper, or copper losses, which it does.

It has been suggested that the primary circuit serving such a secondary will likewise be unbalanced. It is not. It serves three such secondaries, the single-phase load being connected to the three phases in succession. Finally, it is suggested that these three secondaries cannot be electrically tied together, because each of them has a grounded neutral, connected into the middle of a different phase. But they can be (and are) tied magnetically, through conveniently located 230-volt to 230-volt, poly-phase transformers. This magnetic interconnection is not costly and it is effective where required.

Magnetic interconnection of secondaries which cannot be connected electrically has so many forms and so much utility that it is negligence to overlook it. The John C. Parker "translater" arrangement, recently patented, is a high development of the method. There are many simple forms, such as the coupling transformer used in Detroit; double or triple secondary windings on the step-down transformers; and variants innumerable. The commercial value of any interconnection whatever is dependent upon the derived commercial gain, and my own observation is that the expansion of secondaries is notably subject to the law of diminishing returns and ceases to be profitable at a comparatively small total capacity per secondary. There is a wide spread of possibilities between the secondary which takes care of two or three neighboring houses from a 1-kw. transformer, and the engineers' dream of a secondary system continuous over an entire metropolitan area, and distributing hundreds of thousands of kilowatts; and there are few places where anything worth paying for is to be gained by the expansion of any secondary beyond, say, 3,000 or 4,000 kw., or the capacity of three primary feeders. Contrariwise; if the secondary impedance is made so low that large amounts of energy can be transferred within the secondary, a secondary fault may develop into a general interruption of service.

Perfection Not Attained Yet

The foregoing survey of practice shows that the companies that have felt the urge toward the development of a general purpose secondary have responded along divers lines; and that none of the results is perfection. The survey also suggests that existing conditions rather than text-book theories have controlled in each selection. I think this will continue to be the case. If the proponents of the three-phase, four-wire, low-voltage secondary will limit themselves to the statement that in specified locations, or under specified circumstances, that method has sufficient merit to warrant or excuse its adoption, notwithstanding its numerous faults, I could agree with them. But I don't choose to follow their pretty mathematical theorem into a commercial mess.

In this writing the use of the 115-volt lamp is premised for all secondaries. The advocates of the 115-199-volt secondary prefer to use the 120-volt lamp, so as to get 208 volts for motors. That is a step in the right direction. I have been using such lamps for more than 30 years, and this calendar year my company is buying 120-volt lamps only and more than four millions of these, for the use of its customers. If we had a clean sheet the four-wire three-phase advocates would be excusable in going further and proposing a lamp of 133 volts, with 230 volts across the outers. There is nothing sacred about 115 volts as a lamp voltage. It is merely the temporarily expedient compromise among existing costs and conditions. It makes no difference whether the customers buy lamps and pay retail prices for them, or the company buys wholesale and provides free lamp renewals. What must be remembered in either case is that the marked voltage of the standard lamp indicates the pressure at which it will have an average useful life of 1,000 hours, and indicates nothing else of any consequence. Whether the lamp is to be burned out in 1,000 hours or less, or whether it is to be regulated downward from rated voltage and in no case upwards and thereby is to live longer, is to be settled by consideration of the relative costs of energy; of lamp renewals; of secondary copper; and of circuit regulation, and the latter is just as important as the three others. It is almost always unprofitable to apply more than the rated voltage to standard lamps, and conversely to serve standard motors at less than 220 volts is to invite complaints. My company is selling some 750,000,000 kw.-hr. per annum to run polyphase motors, and we would expect a justified riot if we dropped our circuit voltage from 220 and upwards, down to 208 or 199. To put it concisely; voltage regulation for standard lamps should be downward from the manufacturers rating, 110, 115, or 120 volts; while regulation for motors is most acceptable if upward from the manufacturers nominal rating of 220 volts, and these requirements do not clash.

One of my visitors has said that a lamp voltage of 120 would measurably shorten the life of domestic heating appliances and fractional motors used on refrigerators, etc. This effect is so minute as to be negligible. I make this statement after many years use of 120-volt secondaries, supplying hundreds of thousands of domestic customers. The most common heating device in the household is a flatiron, and the burning out of flatiron elements is seldom reported nowadays. Coil heating elements of ranges do not appear to have any shorter life on 120 volts in practice, but would doubtless show it on a laboratory test. In use at 120 volts they run hotter and the housewife welcomes the higher temperature. If and when the voltage gets below 110 volts, she complains of slow cooking, and that is a deadly complaint. As to the fractional horsepower motors, the burn-outs seem to be no more frequent than on 115-volt secondaries. If in addition to their other faults mentioned these contraptions are going to burn out at 120 volts, their makers have one more commercial sin to answer for—but I find them not guilty on that charge.

Congested Area Supply

Someone is going to ask what I would have done had I been called on to supply secondary alternating current in the congested area of the city for which he is responsible. My answer is that I probably would have done just what he did, or what he is going to do; because some local condition will control in almost every such case. For instance: Detroit has a central area which will soon be as congested as any area anywhere. My company for many years has made an attractive rate to customers buying 4,600-volt, three-phase, untransformed current. Nearly one-half of all our kilowatt-hours sold are sold untransformed and at that low rate, mostly to the larger factories. In the so-called direct-current district of Detroit, which is the most congested area, there are now 27 customers—apartment buildings, department stores, hotels, office buildings, theaters, etc., that buy that 4,600-volt, three-phase current and transform it or convert it to meet their own requirements, including therein their elevator service. One theatre now under construction has contracted for this service. There are seven good prospects; five of them buildings being erected; one of

them now served partly by an isolated plant and partly by Edison current; and the other now served by Eidison current. The 4,600-volt service to such customers is by underground cable loops with Merz-Price protection, so that an accident to a length of cable does not interrupt service.

In the light of present knowledge, the 115-119-volt three-phase solution, even if amended to 120-208 volts seems to me to be inferior to the five-wire 115-230-volt two-phase solution. It has no superiority in efficiency or in cost of metering. It calls for a new semi-standard motor, or else a booster for motor service; whereas the five-wire method uses a standard motor already on the market at the standard price. It needs one less street conductor for the frontage—and that is its one indisputable merit as against the five-wire plan. To the contrary, it needs one more conductor and polyphase metering for every three-wire branch, which the five-wire plan does not need.

Someone is going to ask what I recommend. I do not recommend anything today. A recommendation would be premature. I prefer that the various plans should for a while continue to be tried on the dog (or on several dogs) and I am doing some trying on my own pup. My trials have not hurt the pup and they have shown better possibilities than I had expected. I will have to work a scheme successfully on a few thousand customers, for a couple of years, before I recommend it to anybody.

Conclusions

I sum up as follows:

1. I have said nothing adverse to a network or in favor of radial secondaries. To the contrary, I recognize the merits of the network as does every old Edison man.

2. The use of a 120-volt lamp in order to get 208 volts on the outers of a four-wire, three-phase secondary, is irrelevant to the argument. The higher voltage lamp is better on any type of secondary.

3. In discussing networks, and 120 volt lamps, as if these were attributes solely of the four-wire, three-phase circuit, some of the advocates of that form of secondary have beclouded the issue.

4. With identical lamp voltage, with three-wire branches, and with the usual amount of balancing of one customer against another, thereby requiring flow of current in the neutral, the I^2R losses in the four-wire, three-phase secondary will be greater than the losses in the five-wire, two-phase secondary, and as great as in the ordinary three-wire single-phase secondary. For that part of the load which is constantly balanced, specifically the motor load, the losses in the four-wire, three-phase secondary will be greater than in the three-wire delta secondary of 230 volts now used.

5. I am unwilling to accept a general purpose secondary which cannot interconnect with any convenient part of nine-tenths of our present secondary circuits. To express the same objection in other words; a general purpose secondary from which three-wire 115-230 volt branches cannot be run out to do the work now done by ninety per cent of our secondary mileage, is suitable only for special locations and uses. It will be just as local and special as is the direct current, three-wire system of 115-230 volts which persists on its merits.

6. Neither am I willing to accept reduced distribution voltage on any secondary unless there is a surplus of commercial advantage obtainable by the acceptance—which is not proved. I want higher voltage if possible.

7. If special motors are to be used on general purpose secondaries the two-phase motor on a five-wire secondary, 115-230 volts, invites favorable consideration. There will be five wires to each frontage instead of four, which is the only thing to the bad. The motors, weight for weight, are a trifle less efficient. As they are built and sold, this inefficiency is fractional and the price the same. The five-wire secondary will interconnect so far as desired with the three-wire single-phase secondary, with which we now do most of our distribution; or it can send out three-wire branches efficiently. The voltage across outers will not be reduced.

8. If retention of three-phase standard motors in conjunction with standard voltage lamps is the desired objective there is merit in either the Minneapolis booster device or the Detroit general purpose secondary. Continued study of the subject will certainly produce other good suggestions.

9. The increase in the number of cases where a large customer in a congested area buys untransformed primary current, and does his own transforming and converting, indicates an avenue of relief from the immediate pressure for development of secondaries in congested areas.

10. Lest my commendation in paragraph one of a network should be given too much weight, I take occasion to say that the worth-while advantages of a network can be obtained without expanding its limits so that they are coterminous with those of a metropolitan city, or equipping it with a multitude of protection contraptions.

11. What we need at present is more experience with general purpose secondaries. An endorsement now of any type of circuit would be theoretical and premature, whereas practice will produce a secondary—or a choice of secondaries—of proved qualities.

The A.C. Network Situation

THE electrical industry is progressive. It meets new conditions with new developments and discusses these developments in open forums. About two years ago the engineers in the industry compiled opinions and available data on developments in systems which would best and most economically meet service requirements in congested metropolitan areas. As a result of these investigations several properties decided to install the a.c. secondary network systems. The advantages and disadvantages of such a system await more actual service data before the economic limits of application can be decided. Several systems are now in successful operation and others are contemplated. The discussion of Mr. Dow in this issue presents points which should be considered before the system is adopted widely.—Editors.

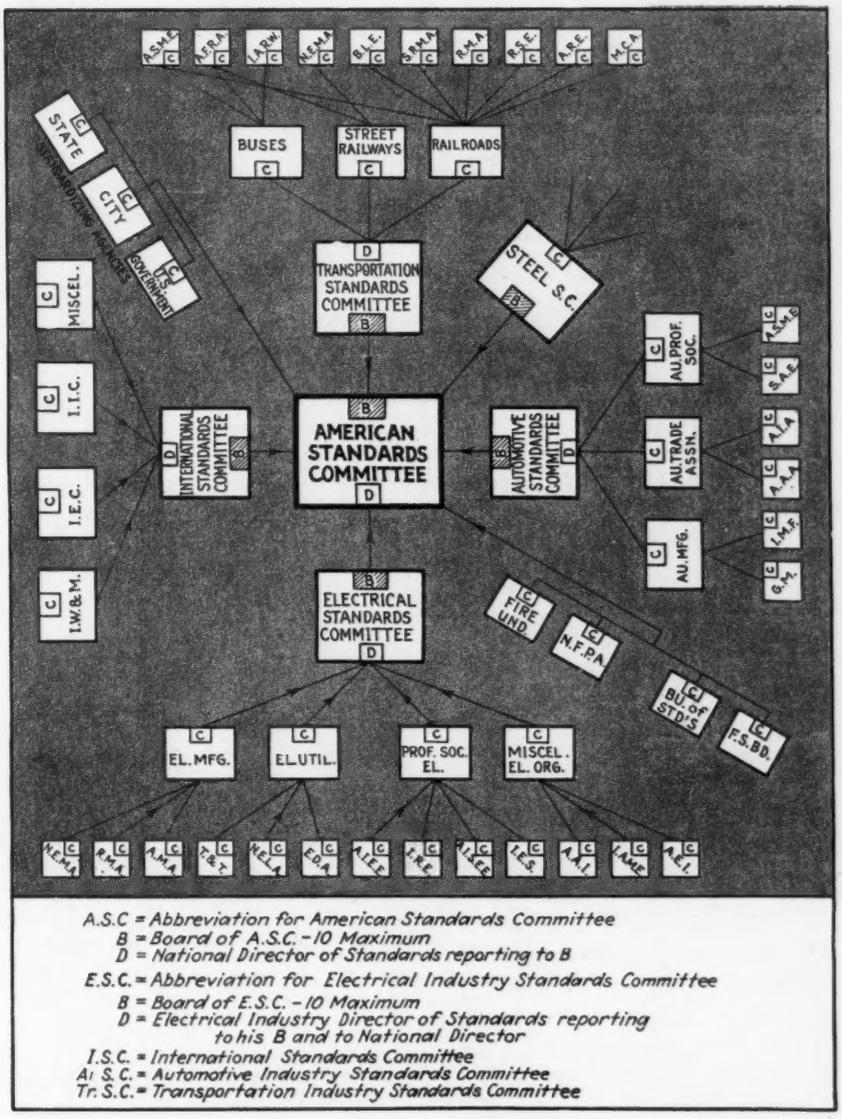
National Standardization

Functional set-up of organization within the industry to expedite standardization procedure. Industry executives must be sold. Complete reorganization proposed

By L. W. W. Morrow
Managing Editor Electrical World

COMMERCIAL standardization is not a matter of opinion. It involves economic and business researches and executive decisions based on facts. The commercial goal is a minimum standard of quality of product for each need of commerce and for the fewest possible varieties and types of commercial services and products. Standardization is an active principle in the conduct of business and as such deserves and needs a standardized procedure. Chaotic, chance and individual standards must give way to those formulated in an orderly and efficient manner wherein the process is continuous to the degree economics and service needs require revisions to be made.

There are 465 standardizing agencies in this country now working as independent units. These groups are unco-ordinated in procedure, methods of support and organization. They have grown as part of the evolution of standardization and have done a good job under the restricted conditions. The time has arrived to plan national and industry standardization on a sounder basis. Enough knowledge of standardization has been had and the cost of supporting these agencies has grown to about $8,000,000 a year. This is too much money to be spent in a hit-or-miss fashion.



PROPOSED NATIONAL STANDARDS ORGANIZATION

Handicaps to Progress

Two major handicaps to the progress of standardization in this country are:

1. American industry executives do not admit that standardization is an essential part of their business activities. They do not give it their attention nor do they support an adequate standardization program. They still must be sold the value of standardization as an economic prop to maintain supremacy and prosperity in national and international business.

2. Past work in standardization has been delegated to unco-ordinated engineering groups, and these have developed a chaotic and ineffective situation. A multitude of standardizing agencies, standardization in the hands of a few professional committeemen, narrow perspectives, a lack of executive authority, secrecy, organization politics and an absence of a uniform policy and procedure are elements that make it wise to approach the whole subject of American standardization with a new perspective and indicate the necessity for relegating all past practices and agencies to the rubbish heap. A new start with a proper perspective would seem better than to attempt to mold the existing agencies and personnel into what is needed to work effectively and efficiently.

In a sense it is unfortunate that the word engineering has heretofore been associated with standardization. This word affords too good an excuse for industry executives to bypass the subject and it obscures the fact that the major standardization projects are simply temporary commercial agreements between buyers and sellers. Engineers have a place and a field in the American standardization program, but it is a minor place in the economic scale of values. Executive and commercial thinking must dominate the standardization movement in this country.

Standards-Making Procedure

Any national policy on standardization should be based on principles that have been found applicable to work of a co-operative character in the world of business. Briefly stated, these principles as applied to standardization are:

1. The power of initiating or suggesting a standard should remain with those units or organizations in industry which first sense the need of standards.
2. The making of a standard should be in the hands of the most competent and most representative group of men to be had in industry.
3. Unanimous acceptance of a standard is necessary to its economic use.
4. The administrative and executive functions dealing with standardization policy and procedure should be distinct from the work of standards making.
5. Procedure in standardization should require a minimum of red tape and time. It should provide for executive action on policy as well as for making standards.

In their application these principles require that each industry and each unit in each industry be organized and that each organization and that of industries as a group shall incorporate all the functions necessary to the initiation, formulation, adoption and operation of standards.

In essential elements such an organization must permit any committee or unit in industry to suggest a new standard. The next step is that this suggestion shall be passed upon by some form of executive clearing house so that the value of the suggestion may be weighed, the scope and influence of the proposed standard measured, the representative group to make the standard suggested and the co-ordination of the proposed standard be made with other industries and with other national standards. The standard should then be made, and as a last step there must be a logical procedure for the acceptance, use and revision of each standard.

Industry Organization Suggested

The accompanying chart shows a proposed organization of American industry for the making of national and international standards. This proposed organization is based on the ultimate development of standards as an essential economic asset whereby all industry considers it worth while to make and use standards. The chart is the *ultimate* organization and is capable of expansion and contraction as standardizing needs change with the changes in industrial conditions.

The central nucleus in the chart is the American Standards Committee. This consists of a national director of standards and a consulting board of directors not to exceed ten men. The director should be a highly paid and very competent business executive who continues in office. The board of directors should be composed of very able and prominent industry executives and representatives of government departments. This central committee represents the executive authority and opinion of American industry and should be appointed and supported by industry. The work of the American Standards Committee should deal with executive aspects of standards policy and procedure of importance to a large cross-section of industry. It is not a standards-making body.

Reporting directly to the American Standards Committee there should be formed an Industry Standards Committee for each large industry such as the steel, the transportation, the automotive, the textile, the electrical, the metal-working, etc. As each industry grows, this committee is found to be a needed element in its standardization program. Each of these industry standards committees should consist of a board of directors of about ten executives and an industry director of standards, who reports to his own board and to the national director of standards. The industry director should be a permanent officer and should be a well-paid business executive. Each industry standards committee serves as the executive authority on standards for its own industry and acts as a clearing house executive contact with the A.S.C. for those standards projects that affect several industries or are international in scope.

Also reporting to the A.S.C. is found an International Standards Committee, with a corresponding board of directors and an international directors of standards as a permanent officer. The I.S.C. is the American contact on all international standards and has as supporting organizations the present international standardizing agencies and representatives of industries interested in international standardization. The I.S.C. is thus the executive group on international standards policy and procedure for all American agencies or groups.

Other groups reporting directly to the A.S.C. are government, state and city standardizing agencies and a miscellaneous group of standardizing bodies that are not affiliated with any industry. Examples are the National Fire Protective Association, the American Society for Testing Materials, the Bureau of Standards and the Federal Specifications Board. Each of these groups, through a committee or other agency, would report directly to the national director of standards on standards policy and procedure.

In some of the large industries it is possible further to decentralize standardization work and to relieve the Industry Standards Committees of many local standardization activities. For example, in the electrical industry four small standards committees could be formed to represent, respectively, electrical manufacturers, electrical utilities, professional electrical societies and organizations and miscellaneous electrical groups. These group standards committees would have a secretary and a small representative board to serve as an executive clearing house on standards policy and procedure for their respective industry units.

To complete the organization there would be a standards committee for each unit of each industry group. The unit committees are already organized and working and the organization plan proposed merely adds the necessary elements to bring about a complete and workable national standards organization.

How the Organization Would Function

The next step is to show how the national and group organizations would function in making standards. Assume, for example, that a committee of the A.I.E.E. in the electrical industry proposes to draft a standard.

Standards Procedure in Brief

1. A standard is proposed by any committee of any industry organization or unit. Notice is sent the industry director of standards.
2. A conference is called by the industry director of standards. This conference consists of the members of the original committee and the industry group standards committee. The topics for discussion are:
   Value of the standard.
   Scope of the standard.
   Industry units or groups affected.
   Recommended representation on working committee to draft standard.
3. (A) If the conference leads to the conclusion that no other industry units are affected, the original committee is authorized to make the standard. The next steps are:
   (*a*) *The standard is drafted.*
   (*b*) *The standard is published as an industry unit standard and as a proposed American standard.*
   (*c*) *A reviewing conference is held, followed by adoption as an American standard.*

   (B) If the decision of the conference is that other groups in the same industry are affected by the proposed standard:
   (*a*) *A representative working committee is appointed by the industry director of standards.*
   The next steps are:
   (*b*) *The standard is drafted.*
   (*c*) *The standard is published.*
   (*d*) *The standard is approved as an American standard after a reviewing conference is held at the call of the industry director of standards.*

   (C) If the decision of the conference is that the proposed standard affects other industries,
   (*a*) *A conference of all interested groups is called by the national director of standards. This conference determines the scope of the standard, the value of the standard and recommends the representation on the working committee.*
   (*b*) *The working committee is appointed by the national director of standards in consultation with the industry standards directors.*
   (*c*) *The standard is drafted.*
   (*d*) *The standard is published for comment.*
   (*e*) *The standard is adopted as an American standard after a reviewing conference of the working committee is held at the call of the national director of standards.*
4. In the event of delays or disputes as to jurisdiction and procedure the boards of directors are called upon by the standards directors as executive authorities. Industry standards directors are considered to be on the staff of the national standards director and follow his policy and orders on national procedure.

As soon as this committee has formulated its opinion of the value, scope and method of making the proposed standard it notifies the industry director of standards and the chairman of the major industry group standards committee—that is, the director of the electrical standards committee and the chairman of the Standards Committee of the Professional Electrical Societies.

Conferences Used Before Standardization Is Started

The industry director of standards immediately calls a meeting of the Professional Society Standards Committee and the A.I.E.E. committee to discuss the proposed standard. At this meeting a decision is had as to the value of the standard and as to the industries or groups in industry that would be affected by the adoption of the proposed standard. If the decision at this stage is that the standard is local in influence or is wholly technical in character, then the A.I.E.E. committee drafts the standard, it is published as an A.I.E.E. standard and as a proposed American standard, and if no comment is received in a stated time, it becomes an American standard. If comments and suggestions are received, then the industry director of standards calls a meeting of interested groups for a hearing and review before the final standard is approved as an American standard.

If the decision at the preliminary meeting is to the effect that the proposed standard affects a cross-section of the electrical industry or other industries, then a meeting of representatives of interested industries is called by the industry director of standards or by the national director of standards. At this meeting the value of the standard, the scope of the standard and the representation desirable in making the standard are discussed and determined. Next a representative working committee is appointed by the industry director or the national director to draft the standard. The standard is then published for comment and criticism. A meeting of the working committee follows, at which the standard is finally reviewed and approved as an American standard. The national director appears as executive in the procedure when several industries are affected and acts as a guide and counselor to the industry standards director. The industry board and the national board are called upon to act in the event their advice and aid are considered desirable or in the event executive action is needed to clarify a situation which may develop.

Directors Serve as Co-ordinators on National Standards Policy

The directors of standards serve to co-ordinate the national aspects of the situation and full initiative is left to the units that are engaged in making the standard. The directors see that the standard is worth while before it starts and brings to bear information and counsel whereby the committee that makes the standard is representative of all interests affected by the proposed standard. *The power of veto and the requirement that any standard adopted be accepted unanimously safeguard any industry unit interested in the proposed standard.*

The proposed plan in national standardization is submitted as a definite scheme of organization for discussion. Some national plan is needed in the present chaotic situation and the industry will no doubt soon proceed to build an organization. This plan is suggested in a constructive and helpful spirit.

Hartford's New Farm Rate

A CO-OPERATIVE farm-service rate has recently been established by the Hartford (Conn.) Electric Light Company to demonstrate that farm business can be developed to a self-sustaining volume if agriculturists respond well to the offer. In announcing this rate the company stated that the major problems to be solved before farmers can be furnished with electric power at attractive prices are: (1) To find out how enough power (assuming an attractive price) can economically be used to make rural lines self-supporting, and (2) to find a method of financing the relatively large investment in power machinery that is essential.

The rate is of the combination flat and meter type as follows:

Flat rate, $3.50 per month per kilowatt of demand (minimum demand 2 kw.) plus

Energy at 2 cents per kilowatt-hour by meter (minimum, 80 kw.-hr. per month per kilowatt of demand).

The company's offer waives the demand charge for five years to the extent that the customer is purchasing apparatus to be electrically operated. At the expiration of the five-year period the customer has the option to elect in the place of the farm rate any applicable rate available to other customers of the company. The contract may also be canceled after one year by giving the company 30 days' written notice of such intention.

Under this rate the cost of line extension is assumed by the customer, less the following credits: (1) The total amount of the energy charge paid to the company over a period of three years from completion, including payments made by others taking service from the extension, and (2) $100 for each kilowatt of use developed at the end of three years by the individual consumer.

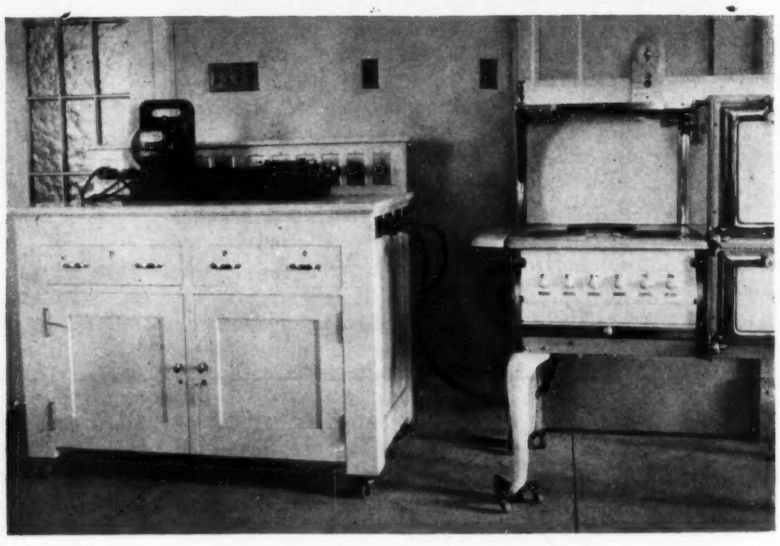
The farm rate applies to extensions on state or town highways and in all cases satisfactory credit must be established with the company. The farmer pays cash to the company for construction on his own premises. Notes are then accepted for the total cost of the line extension as estimated.

The offer is also available for a single alternating-current service on existing lines, for general farming purposes, to commercial farm customers conducting agricultural, dairy, poultry or similar commercial operations covering at least three acres with gross sales of produce exceeding $350 a year. Electricity for residences on the same property and occupied by the farm owner or his employees may be combined with farm uses on this schedule if all service is supplied through one meter. All apparatus used on the schedule is subject to the approval of the company as to sizes and types, and except under special conditions no motors larger than 7.5 hp. and no multiple unit heating equipment larger than 10 kw. can be supplied on it. The energy charge is also adjusted to fuel cost variations. The demand is billed by demand meter on a 30-minute interval except where tests show violent fluctuations exceeding twice the measured 30-minute demand, in which case demands obtained by test may apply for the estimation of the charge.

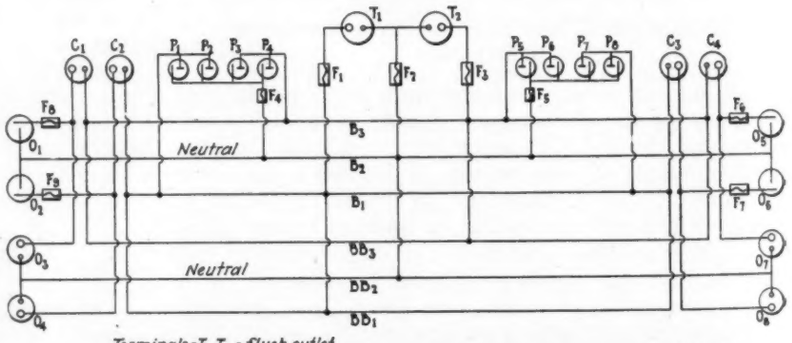
Power Table for Testing Household Appliances

FOR convenience in testing household electrical appliances in the Division of Home Economics at the Iowa State College of Agriculture and Mechanic Arts, Ames, Iowa, a special power table, shown in the accompanying illustration and diagrams, is used. The table is wired with two independent circuits so that two sets of tests may be conducted at the same time.

Outlets along the side are arranged so that either heavy or light equipment can be plugged in, and outlets along the top are provided for testing instruments. Miss Eloise Davison, assistant professor of home economics, has found that use of the table in making tests has largely done away with special or temporary wiring. The construction of the table and layout of electrical circuits were designed jointly by Miss Davison and Frank D. Paine, professor of electrical engineering at Ames.



POWER TABLE WITH ELECTRIC RANGE ON TEST



Terminals - T_1, T_2, - flush outlet
Fuses - F_1, F_2, F_3 - 100 ampere; F_4, F_5, - 1 ampere; F_6, F_7, F_8, F_9, - 15 ampere; all cartridge type
Current taps - C_1, C_2, C_3, C_4 - flush outlets. Plug for same to be short-circuited
Potential taps - $P_1, P_2, P_3, P_4, P_5, P_6, P_7, P_8$, - flush plate 10 ampere outlets, polarity type
Outlets - O_1, O_2, O_5, O_6, - flush plate 10 ampere outlets, polarity type
Outlets - O_3, O_4, O_7, O_8, - flush plate outlets
Busses - B_1, B_2, B_3, - No. 8 copper
Busses - BB_1, BB_2, BB_3, - No. 2 copper or equivalent

WIRING DIAGRAM OF POWER TABLE

Fair Play in Merchandising*

By H. T. SANDS
President National Electric Light Association

Early merchandising practices no longer necessary or desirable—Answers given to Fowler questions at Atlantic City N.E.L.A. convention—Relations with contractors and dealers announced

H. T. SANDS

THE development of the electric light and power industry in this country is one of the marvels of the age, yet neither the public nor those of us who have been on the firing line for many years really give much thought to the toil and travail that have accompanied this development.

We started out as pioneers on uncharted seas. We had no precedents to follow except those recognized as successful in ordinary private business. In fact, for many years both the public and ourselves looked upon our business as a private business, subject only to those economic laws that pertain to any well-conducted private enterprise. We were selling a service that was new. The public was skeptical of its value and sometimes afraid to use it. Oftentimes we were subjected to competitive divisions of the territory we served and were forced to price cutting and other measures to retain our very existence.

Each electric light company was a unit and a law unto itself and was fighting its own battles with nothing more than its own selfish interests in view.

Looking back on some of those early days, I wonder that we got along as well as we did. The electric motor had not yet made its advent. All we had to sell was lighting, furnished through the medium of a highly inefficient carbon filament lamp, supplied with current from stations and lines none too well constructed and maintained.

We felt it necessary to utilize every means at our command to extend our business. These means often took the form of wiring at cost, less than cost and sometimes free. We looked upon the wiring contractor as a competitor and an enemy rather than as a friend and an ally. I can well recall the time when I thought more of getting a wiring job away from a contractor than of securing a new customer. We complained that the contractor was hurting our business through inadequate wiring and ignored the now seemingly obvious fact that our policy forced the contractor in many instances to install wiring in the cheapest possible manner to meet the competition of the electric service companies.

All of this is now history, and you doubtless wonder why I am taking time in its recitation today. My object is twofold: First, to present a picture of a situation that fortunately exists now only in a very limited degree, and second, to point out that those conditions existent in the early days, and which were regrettable as we now see them, were but the growing pains of an infant industry and the logical outcome of the development of a new business the fundamentals of which were but dimly understood even by those engaged in it.

About a decade ago, seemingly over night, we stepped out of our swaddling clothes into full-grown manhood; seemingly all at once it dawned upon us that electric light and power service had demonstrated its worth and that practices that seemed necessary in the early days of the industry were no longer either necessary or desirable.

We awoke to a realization that the furnishing of adequate electric service to this country was a tremendous task and that in the rendering of that service we needed the help and co-operation of every branch of the industry; that because we were engaged in furnishing electric service, there was no more reason for the public to expect wiring or appliances to be furnished at less than cost, or even at cost, than to expect the coal dealer to furnish stoves and furnaces on the same basis.

We realized that the wiring contractor had a legitimate place in our industry, was an ally rather than an enemy or competitor and was entitled to a fair margin of profit. I say "we"; it would be more correct to say "many of us," referring of course to those of us engaged in the supply of electric service.

It is not easy to alter a habit once fixed and there are doubtless electric light and power companies today retaining much of the viewpoint in respect to the other

**Paper presented at Electragists Convention, St. Louis, Mo., Aug. 10, 1927.*

branches of the industry as obtained twenty years ago. I believe, however, that this class represents but a small proportion of the electric service companies of the country. We have not reached the millennium by any means, but I believe we are on our way.

Fowler Questions Answered

In the most admirable paper presented by Mr. Fowler of our organization at our convention at Atlantic City last June, he offered seven questions—questions indicative of the mental attitude of the men in your industry. I am going to undertake to answer these questions. Let it be understood, however, that these answers are but a statement of my own ideas and must not be taken as a statement of the position of either the National Electric Light Association or the electric light and power industry. It is my belief, however, that they represent the preponderance of opinion of those engaged in the light and power business.

"Has the dealer had a fair chance to do a real selling job?"

In some instances, yes. In others, decidedly no. In all instances he should have had it.

"Is it possible for central-station salesmen to sell on commission without misrepresenting the company, its goods or its competitors?"

I believe it is perfectly possible under the right type of sales manager and the right kind of salesmen. No central-station company can afford to retain a salesman who makes misrepresentations of any kind.

"If the utility makes it impossible for the dealer to market standard products profitably, should he abandon the field or attempt to compete with less dependable products?"

Which of these courses, if either, should be adopted should be decided by the individual contractor, but neither should be undertaken until every effort has been exhausted to create a situation in which it is possible for the dealer to market standard products profitably. If local efforts fail to create such a situation, then appeal should be made to the respective national organizations to exert their good offices to obtain this result.

"Does the public relations section take the contractors and dealer into consideration as a possible asset in building customer good will?"

Most assuredly, yes.

"Does the average utility executive care whether or not the contractor-dealer respects and trusts the service company?"

No utility executive is fit for his position who is not concerned that every element in the community should respect and trust his company, and most especially so those elements whose co-operation are necessary in the upbuilding of his business.

"If the contractor-dealer fails to measure up to expectation, does the power company attach any of the blame to its lack of sympathy and understanding?"

This is a hypothetical question and an intelligent answer is possible only through knowledge of all of the attendant facts. I am not attempting to duck the answer, but frankly, I do not know how to frame an answer that would fit every case suggested by the question.

"Has the central station a moral or legal right to sell merchandise or do inside wiring at less than cost and charge the loss to energy-selling expense?"

Not being a lawyer, I will not attempt to answer as to the legal right. As regards the moral right, I believe such a course to be unethical, unsound, unbusinesslike and entirely unnecessary.

There is an old hymn, doubtless familiar to many of you, the title of which, if I recall it rightly, runs, "We Shall Know Each Other Better When the Mists Have Blown Away." Between the two branches of the industry represented by your organization and ours there have been mists—mists of suspicion, of doubt and, I regret to say, at times of enmity. But these mists are disappearing and will still further disappear as there dawns upon us a clearer understanding of the magnitude and the importance of the task to which we are committed—adequate electric service nation-wide. That is our aim and goal.

No branch of the industry working within itself can approximate that goal. All of the branches of the industry working independently, each seeking its own selfish ends, will fall far short of that goal; but with all branches working in close co-operation and harmony, we can achieve magnificent results.

Program Announced

How then shall we proceed to assure this result? What is the need of the hour?

First of all, we need to wipe the slate clean and make a fresh start, to call for a new deck of cards and to have a new deal. To my mind we need less recrimination and more co-operation. Less thinking and talking about what has been done and more thinking and talking about what there is to be done. Less trying to place the blame for the past and more constructive, co-operative thinking for the future.

You may say this is mere idealism, and I grant you it is nothing more, provided we do not actively set about to resolve idealism into practicalities. Ideals we must have, but to translate ideals into vital realities we are obliged to work through practical ways and means. Let us have no delusions about what we are to attempt. The task before us is by no means easy. No matter how sound the policies formulated by your association and ours, the carrying out of those policies depends upon our members, over whom we have no control and upon whom we can exert only moral influence.

How then can we best proceed to bring about a larger measure of real co-operation on the part of every branch of the industry? I think you are all aware of the plans for reorganization of the Society for Electrical Development. Although these plans are still more or less in the formative stage, they have progressed far enough so that we can see quite clearly possibilities for a large co-operative movement. I believe that in this proposed reorganization will be found the medium for bringing about this most to be desired result; that here will be afforded an opportunity for the representatives if the four great branches of our industry—the electragists, the manufacturers, the jobbers and the electric light and power companies—to meet on a common ground, get around the table on an equal footing and formulate plans for co-operative action.

But even here we shall not progress far unless each individual director of the society is imbued with the spirit of co-operation and impressed with the magnitude and importance of the task that lies before us. In view of the experience of the past decade, no one can visualize with any degree of accuracy the magnitude of that task; but we do know that there lies immediately at our hands an opportunity through team play to render an

increasingly valuable electric service to the American public.

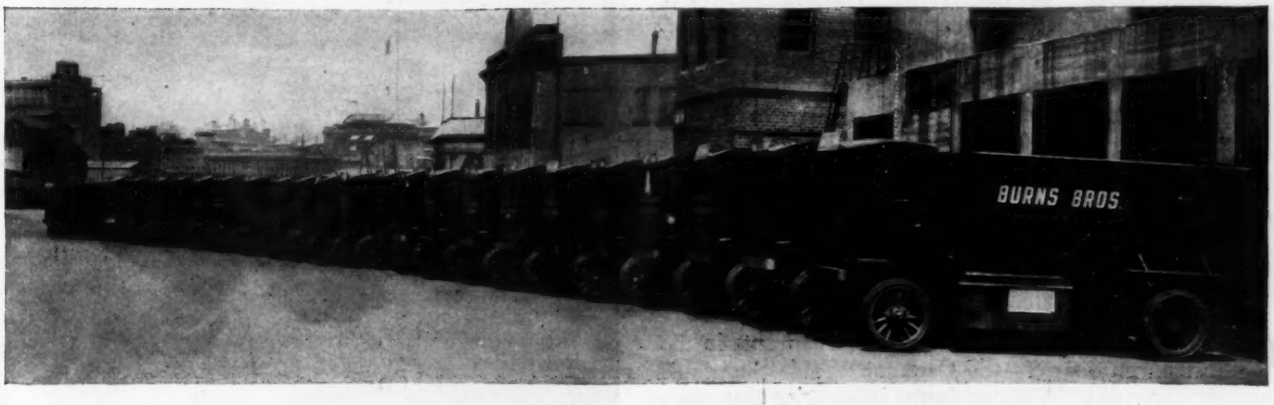
Much of the lighting in the homes of this country is entirely inadequate. Doubtless when installed it represented the best practice in domestic illumination, but owing to the tremendous development of the incandescent lamp it is now obsolete and inefficient. To provide the homes of this country with adequate, up-to-date illumination, which will serve not only to light the home but also as a harmonious part of the home decoration, is in itself a huge task.

The extension of electric service to farm homes and farm work is another undertaking of immense magnitude and importance, an undertaking involving tremendous social as well as economic benefits. If we can extend to the farm the same opportunity now enjoyed by industry—namely, increased production because of available power; if we can relieve the farmer's wife of much of the drugery that farm life now entails; if we can make life on the farm more attractive to the farmer's boys and girls, the social benefits conferred by such action will be greater than has yet been contributed by any single industry.

In the field of commercial lighting there is an outstanding opportunity for improvement and expansion. In many commercial institutions there exists the same condition as in the homes wired in the earlier days. The illuminating engineer, the electragist and the light and power company, working together, can bring about a revolution in commercial lighting with resultant benefits to the user of electricity as well as to those interests engaged in its production and distribution. As the motive power of industry, electricity has already wrought tremendous changes in the industrial and economic life of the nation, but its possibilities have by no means been exhausted. Never in the history of the electrical industry has there been greater opportunity for expansion and development.

We must not, and I believe shall not, allow ourselves to be so blinded by personal differences and grievances that we fail to see the wonderful opportunity just ahead. To realize this opportunity in its fullest measure, the National Electric Light Association stands ready, willing and anxious to co-operate with the other branches of the industry in every possible way and to the fullest possible extent.

Electric Trucks Aid New York Coal Men



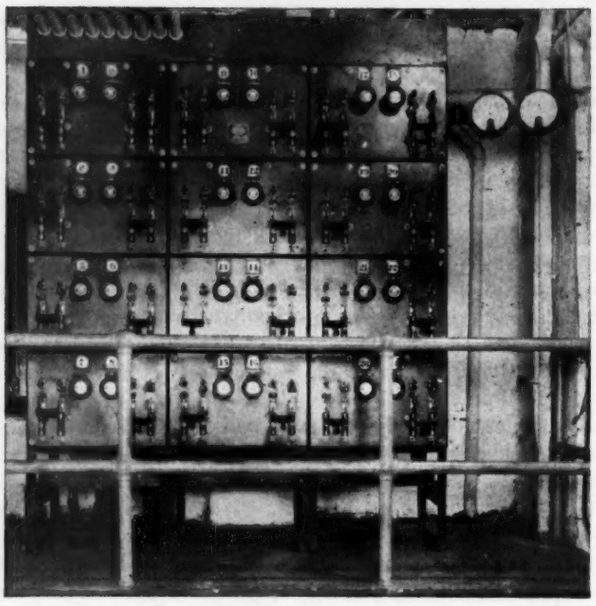
EACH ELECTRIC TRUCK USED BY BURNS BROTHERS REPLACES FIVE HORSES

ECONOMICAL, sustained service is the prime requisite of coal-delivering equipment. Burns Brothers, New York coal dealers, have discovered that electric trucks answer this requirement. Several years ago this company purchased six electric trucks for experimental purposes to acquire operating data under the conditions that must be met in metropolitan areas. They now have 27 heavy-duty electric vehicles, eliminating approximately 150 horses, with a saving of about 50 per cent in floor space of the yards and a reduction in cost for the haulage of coal through congested areas. According to S. A. Wertheim, president of Burns Brothers, "these trucks have functioned with practically ideal dependability, delivering, on an average, 50 tons of coal per day through all kinds of weather—a splendid record for any type of truck."

In this service 6½-ton trucks appear to offer the most desirable capacity. Recent purchases by this organization include twenty 6½-ton and one 8-ton electric vehicles and represent an investment of more than $100,000. Careful shop supervision is maintained. The electric truck requires less attention than any other type of vehicle. It has fewer parts to suffer the wear and tear incident to operation, and for this reason operators often fail to give their trucks the proper attention. Proper maintenance is an essential requisite if satisfactory service is to be sustained.

Data have been kept of the quantity of coal delivered by the trucks on various trips. All records for economical coal delivery, heretofore considered unbreakable, have been bettered by electric trucks. In one instance 300 tons of coal was delivered to a customer located a mile and a quarter from the pockets with an average load of 6.38 tons per truck and round trip mileage of 2.58 per truck. Delivery was completed in nine hours with three trucks making about sixteen trips; the total energy consumption was 194 kw.-hr. or 1.59 kw.-hr. per mile.

"As the result of observation," says Charles R. Skinner, Jr., manager of the automobile bureau, New York Edison Company, "it has been estimated that the electric truck fleet transports approximately 2,941,940 lb. of coal per day, or about 882,852,000 lb. per year, enough to supply 29,419 homes for one year. The electric truck fleet travels about 531.6 miles per day, or 159,480 miles



TWENTY-FOUR 100-AMP., 120-VOLT OUTLETS PROVIDED FOR CHARGING BURNS BROTHERS ELECTRIC FLEET

per year, the operation consuming approximately 1,130 kw.-hr. per day, or 339,000 per year."

The switchboard for charging the electric trucks at the garage consists of twenty-four 100-amp., 120-volt outlets. It is installed on a concrete platform about 3 ft. from the floor, both for protection purposes and to give the operator clear vision of the garage.

Commercial Electric Cooking Costs 6 Mills per Meal

By L. H. Lingemann
Power Sales Engineer Duquesne Light Company, Pittsburgh, Pa.

ONE of the most popular chains of restaurants in the Pittsburgh district—the Gammon Waffle Shops—is entirely electrified. A major factor influencing this practice has been the fact that favorable restaurant locations in downtown Pittsburgh's congested business district command comparatively high rentals. Efficient utilization of space, made possible by electrical applications, therefore is essential to secure the maximum number of meals served for any given period and thus reduce the fixed charges per meal. Furthermore Mr. Gammon, owner of the chain, firmly believed before electrifying his restaurants and was convinced afterward that customers would welcome the idea of seeing their food prepared and having it served piping hot.

ELECTRIC RANGES, BOILERS AND TOASTERS AT REAR OF COUNTERS SAVE SPACE IN GAMMON WAFFLE SHOPS

CONNECTED LOAD, MAXIMUM DEMAND, LOAD FACTOR, COST PER MEAL AND REVENUE FROM THREE COMMERCIAL ELECTRIC COOKING INSTALLATIONS

Installation	A	B	C
Connected load: cooking	70	93	110
Heating	20	.....	.....
Light	10	5	10
15-minute maximum demand (kw.)	74	65	76
Average monthly consumption (kw.-hr.)	41,300	33,000	33,160
Number of meals served per month	50,000	80,000	80,000
Watt-hours per meal (including light, and cooking)	828*	412	414
Average montaly cost of electric service	$559.68	$485.24	$524.96
Average cost per kilowatt-hour	$0.0135	$0.0143	$0.0158
Load factor (per cent)	78	70.5	61
Cost per meal for electric service	.....	$0.00606	$0.00658
Monthly revenue per kilowatt of demand	$7.56	$7.46	$6.90

*Including store heating

ELEVATED WAFFLE IRONS AND COFFEE PERCOLATORS INSTALLED ON COUNTER

Before installing electric cooking the owner decided to investigate its possibilities by equipping his home. His experiences were so satisfactory that he opened his first shop with all food prepared in full view of his customers and with all electric equipment. So popular has this idea become with Pittsburghers that the Gammon Catering Company now has six restaurants all designed along the same general lines. The waffle iron and percolators are placed on the counters, where they are in almost constant use. All of the short-order cooking is done on equipment to the rear of the counter.

Data secured from some of these installations are given in the accompanying tabulation. The figure of 828 watt-hours per meal for Installation A is high in this particular case, as during the period when these readings were taken 20 kw. of connected load was used for heating the restaurant.

Letters from Our Readers

Facilities for Oiling Domestic Electric Devices

To the Editor of the ELECTRICAL WORLD:

R. D. Coombs' pungent letter in your issue of Aug. 13 prompts me to add a word or two to his contribution to a somewhat neglected subject. We had occasion recently to give a ruling on the installation of a number of very attractive-looking machines designed to obviate the use of towels for drying the hands after washing. They had been passed upon by the Underwriters' Laboratories, but as there were no facilities for oiling the motor save by removing the inclosing cover, we did not think that janitors and other persons, uneducated as to the risks involved, should have to poke oil cans, to say nothing of their hands, among various exposed electrical contacts surrounded by a grounded metal inclosure. The manufacturer concerned raised strong objection when we called for a complete cut-off switch to be installed at the machine to render the circuit "dead," but the added expense could have easily been avoided had the manufacturer used a little horse sense in regard to the oiling facilities provided.

It seems to me the manufacturing industry should pay greater attention to such matters by providing oiling facilities.

F. A. CAMBRIDGE,
City Electrician.

Winnipeg, Manitoba.

* * * *

Success of Rural Range Depends on Service Continuity

To the Editor of the ELECTRICAL WORLD:

In your issue of July 9 appears an editorial on "Costs in Farm Cooking" which leaves out one side of the problem that bulks large in the mind of the prospective rural range-load customer. I refer to the matter of service outages. The call of the farm stomach is just as insistent as that of the metropolitan stomach, and promptness in meeting the schedule of meals is as essential to successful farming as the maintenance of schedules for plowing, planting and harvesting. With the electric range, unless supplemented by some other heat source, meals are subject to frequent delay and sometimes to total absence due to service interruptions on farm lines.

My own experience affords a case in point. I am spending the summer in a small manufacturing and farming community 40 miles from Boston which is supplied with rural electric service by a small subsidiary of a holding company. This company purchases power from a transmission company at a small local outdoor substation. The loads supplied are not great enough to justify duplication of transmission, substation or distribution facilities, and interruptions to service are far from infrequent. Thunderstorms, near or still hidden behind the horizon, often leave food half done in the oven or on the range. Substation and distribution troubles have doomed hungry mortals to dine on hurriedly opened canned foods requiring no cooking. Power has been off, at times unexpectedly, for from one to eight hours, leaving us not only to eat what can be picked up cold but also to conserve penuriously every drop of water.

Under such conditions the question of service continuity bulks larger in the rural mind than either the first or the operation cost of the electric range. Washing, ironing, sawing wood, grinding feed and numbers of other farm duties requiring power may be set aside for a time pending restoration of service, but breakfast, dinner and supper must be ready on time.

There is no question that in metropolitan areas where continuity of service is assured the electric range is a success. It will not be a success in the rural community until its readiness to function continuously when wanted is assured by sufficient duplication of transmission, substation and distribution facilities to provide reasonable continuity of service. This requires a greater investment by the power company, which at the present rate is not financially justifiable.

WELLEN H. COLBURN,
Electrical Engineer.

Boston, Mass.

* * * *

Electric Cooking for the Farmer Has Supporting Data

To the Editor of the ELECTRICAL WORLD:

We appreciate very much the boosting of electric cooking contained in your editorial "Costs of Farm Cooking," printed July 9. There is no question that we must "sell" to the farmer the fact that electric cooking is economical, that he can afford to use it, that for value received it gives back a high degree of return in the service rendered.

Your editorial writer, however, overlooked the fact that the relative cost of electric cooking compared with fuel has been studied and set forth, for example, in the following bulletins: "Economics of Electric Cooking," *University of Missouri Bulletin,* Vol. 16, No. 27, 1915; "Kitchen Tests of Relative Costs of Various Fuels and Electricity for Cooking," *Ohio State University Bulletin,* 1917; "Fuel Economy in Domestic Heating and Cooking," *State College of Washington,* Series 1, No. 32, 1917; "Electric Cooking Appliances," *Kansas State Agriculture College Bulletin,* Vol. 1, No. 20, 1917.

It appears to us, however, that very little is to be gained by comparative costs. The advantages of convenience, cleanliness, satisfaction, controlled cooking results, etc., do not show up in such studies. The idea of vacuum cleaning would not have got very far on the comparative cost of vacuum cleaning versus sweeping, but various bureaus of home economics did promote the idea of vacuum cleaning because of its convenience and sanitary characteristics.

The work being done by the Committee on the Relation of Electricity to Agriculture in the various state projects is demonstrating the satisfactory cost of electric cooking in the most practical manner, i.e., by getting farmers at strategical points actually to try electric cooking and demonstrate it to themselves.

Apart from the work of the C. R. E. A., which has to do especially with the extension of rural lines to outlying places, many central stations where electric ranges have been exploited for a number of years can, doubtless, furnish considerable data as to the cost of cooking in farm homes. It may not be generally realized, but in the State of California approximately 23 per cent of the farms have electric ranges. This means the use of more than 12,000 ranges.

H. J. MAUGER,
Staff Assistant to the President.

Edison Electric Appliance Company, Inc.,
Chicago, Ill.

Digest of Electrical Literature

Hydro-Electric Development and Steam Equipment

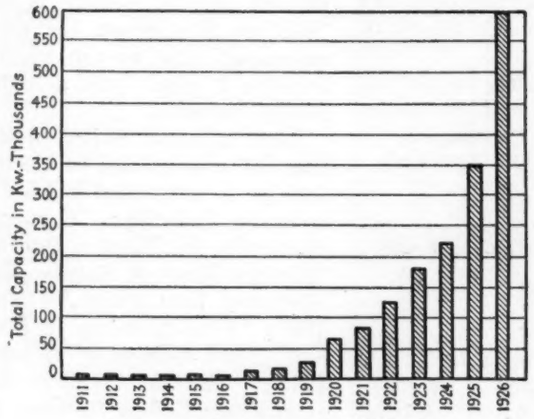
Tests on the Experimental Arch Dam on Stevenson Creek, Cal. — FRED A. NOETZLI. — The results of the test on this experimental arch dam are reported to the extent of present investigations. The dam was provided, in the course of construction, with suitably equipped instruments for measuring deflection, strain and temperature. Several complete series of readings of all the instruments were made during the period of the curing and hardening of the concrete. Tests were made of various conditions during the filling of the basin, thus giving data for different water levels behind the dam. Invar steel bars inserted in the bed rock permitted accurate measurement of the spreading effect of the canyon walls. The deflections measured at various times permitted the calculation of the moments, shears and loads involved in this structure. The experiments, while not complete, point to the conclusion that the arch pressures in the dam were not uniformly distributed over the cross-sections of the elementary horizontal arch, as could be assumed in a design based upon the ordinary cylinder formula. A definite amount of the water load is carried by the elementary vertical beam and the remainder supported by arch action. The bending stresses in the horizontal arches are quite marked and cannot be neglected. It is indicated that this experimental dam structure approximated an elastic body. It is planned that the dam be tested to destruction. Stress diagrams and deflection charts indicate some of the results obtained in this work.—*Engineering (England)*, Aug. 12, 1927.

Generation, Control, Switching and Protection

Third Harmonic in Y-Connected Three-Phase Systems. — R. KIEFER. — The circulation of a triple-frequency current in core-type three-phase transformers which are Y-Y connected may be avoided by the addition of a closed delta tertiary winding, by the connection of one Y point to the neutral point of a three-phase choke coil connected to the system, and by a tie from the primary Y point to the generator Y point by a metallic line or ground. Former investigations of the third method neglected the influence of the third harmonic upon the generator, a factor which must not be overlooked. The author offers a mathematical investigation, followed by data from laboratory tests, on this third method, with a consideration of the conditions in both the transformer and the generator under full load. It was found that the third harmonic current is subject to a reversal in a generator operating at no load. At normal voltage the triple harmonic in the generator opposes that of the transformer, so that a Y connection of the two is detrimental to the magnetization of the transformer if the third harmonic in the generator exceeds that of the transformer.—*Elektrotechnik und Maschinenbau*, June 12, 1927.

Transmission, Substations and Distribution

Mercury-Arc Power Rectifiers. — O. K. MARTI and H. WINOGRAD.— Steel-inclosed mercury-arc rectifiers are, because of their advantages over rotary converters in efficiency, ease and reliability of operation and ability to produce high direct-current voltages, gradually replacing other forms of converters in all fields of application. According to the authors, there are at present 600,000 kw. of rectifier installations distributed over different parts of the world. The high efficiency and reliability of rectifiers at high voltages are credited with a probable influence upon the selection of systems and voltages for main-line railway electrification. Comparative operating figures for rectifiers and motor-generator sets at 3,000 volts direct current are given in this article. Owing to the fact that the direct-current voltage of a rectifier consists of portions of sine waves, the voltage wave is somewhat undulated. The magnitude of the undulation depends on the number of phases and varies with the load. The effect of undulation in the voltage wave upon the shape of the current wave for various types of loads is discussed, and the oscillograms of the voltage and current waves of a rectifier feeding a railway load under differing conditions are shown. A discussion is offered showing the effect of the undulating characteristics upon various kinds of loads and upon communication circuits paralleling the direct-current feeders.—*Journal of American Institute of Electrical Engineers*, August, 1927.



GROWTH IN NUMBER OF MERCURY-ARC POWER RECTIFIER INSTALLATIONS

Research on Characteristics of Impregnated Paper Insulated Cable.—The serial report of the underground systems committee of the N.E.L.A. includes several papers covering various items in connection with research work conducted under the direction of the subcommittee at four leading educational institutions. The influence of residual air and moisture in impregnated paper insulation was investigated in connection with the sharp rise in the power-factor-voltage curve of high-voltage cables which is commonly attributed to the ionization of entrapped air or gases. Cable samples are described and an outline of the tests used is given, curves illustrative of the results and conclusions being included. The thermal properties of underground cables were investigated, and tests of the resistivity of the insulation and the heat-dissipating characteristics of the sheath in free air were made for nine impregnated paper cable samples. An investigation of the mechanical and electrical characteristics of the paper used for cable insulation and the effect of heating at various temperatures, with the resultant impairment of mechanical strength and the effect upon the dielectric strength, was also undertaken.—*Report to National Electric Light Association*, August, 1927.

Illumination

Determining Efficiency of Illumination.—W. GRIX.—A German equivalent of the well-known American foot-candle meter makes possible the quick determination of the intensity of illumination. It is possible to measure light intensities with a minimum of effort and with a high degree of accuracy by the use of this instrument. The contractor may place lights in such a way as to predetermine, with reasonable accuracy, the desired ultimate density of illumination. A graphical method is described for finding the efficiency of illumination or ratio of the useful light to the produced light, taking into account the losses in the lamp inclosure, the ceiling and the walls. The method assumes that the light intensity in lumens for various lamps and voltages is known for a series of lamps from, say, 25 watts to 1,500 watts. The paper contains generally applicable charts, which cover a wide variety of practical applications.—*Elektrotechnische Zeitschrift*, June 16, 1927.

Motors and Control

Dynamic Balancing Machine for Small Armatures.—The balancing of armatures of small electric motors and similar machine parts produced in comparatively large numbers and designed to be operated at relatively high speeds may be simplified by the use of a new type of dynamic balancing machine. A simple device and procedure enable the operator to determine the radial plane in which the out-of-balance forces act. The machine is particularly suited for balancing large numbers of smaller bodies, and great saving in time may be effected by its use.—*Engineering (England)*, Aug. 12, 1927.

Heat Applications and Material Handling

Manufacture of Steel in One Process Direct from Ore. — OLIVER SMALLEY AND FRANK HODSON. — Two processes which have been developed within recent years, which enable the production of high-grade steel to be achieved in one operation direct from ores, and which are both under certain conditions commercially successful, are described by the authors. Both methods utilize electric furnaces to achieve the desired heating effect. The Pehrson-Prentice process utilizes a rotating louver furnace, which is provided with longitudinal conduits placed at, near or in the peripheral wall. These conduits have lateral flues through which the gas enters the charge, means being provided whereby the latter is prevented from entering the slot. The furnace is remarkable for its high thermal efficiency in the pre-reduction of ores and in the author's opinion is far in advance of other methods producing sponge iron. The Carsil process uses the conventional type of electric furnace, and it is stated that where cost of ores, electrical energy, transportation, labor and market conditions are favorable it has extraordinary possibilities. It is of the arc type. It is concluded that sufficient practical results demonstrate that steel made direct from ore is not only superior to steel made by other processes, but that these test results effectually answer all criticisms as to the potential future of direct steels.—*Paper presented before American Electrochemical Society*, 1927.

Electrophysics, Electrochemistry and Batteries

Electric Double Refraction in Relation to the Optical Anisotropy of Gaseous Molecules.—ARTHUR BRAMLEY.— From a consideration of the variation of the index of refraction of a gas with electric intensity due, first, to the change in the potential energy of the molecular system arising from the reaction of the electric field on the permanent moment of the molecule and, second, to the dependence of the probability of transition on the relative orientation of the direction of the electric vector in the incident wave, and therefore of the direction of transition with respect to the axis of the permanent moment, a value for the Kerr constant, or specific rotation of the plane of polarization in unit electric field intensity, is derived. The dependence of the probability of transition with direction relative to the polar the molecular structure in terms of axis explains the optical anisotropy of properties of the molecule which arise in the discussion of the spectral properties of the molecule, and also the observed phenomena of the depolarization of the radiation scattered by anisotropic bases.—*Journal of Franklin Institute*, August, 1927.

Spectral Intensity Distribution in a Hydrogen Discharge.—E. W. TSCHUDI. —It was the purpose of this investigation to determine whether the increase in illumination reported by Wehnelt and Jachan was the consequence of an increase of spectral illumination to the same degree for each hydrogen line, and specifically to examine the effect which an electronic bombardment would produce upon the spectral intensity distribution near the cathode of a hydrogen discharge tube. The apparatus consisted of a cold cathode discharge tube with an auxiliary tube attached from which cathode rays were projected against the main cathode. A photoelectric cell attached to a monochromatic illuminator was used to measure relative intensity distribution from the main cathode through the cathode dark space into the negative glow with and without excitation of the auxiliary tube. The results indicate that when the main cathode is bombarded by the electron stream the intensity of spectral illumination in the negative glow is increased by about 20 per cent. This increase does not result from the mere addition of illumination, but is due to the production of soft X-rays capable of exciting the gas molecules.—*Journal of Franklin Institute*, August, 1927.

Telegraphy, Telephony, Radio and Signals

Hysteresis in Vacuum-Tube Oscillators. — LAURISTON S. TAYLOR.— By means of a synchronized cathode-ray oscilloscope with a linear time axis the theory of the various oscillations in vacuum tubes was checked on the basis of the assumption that the circuit when oscillating in the intermittent state did not suffer any appreciable wave distortion and that the oscillation frequency remained constant. Reproductions of the oscilloscope patterns are given showing the wave form in the oscillatory circuit. When a blocking condenser and resistance are placed in the grid circuit of the vacuum-tube oscillator the oscillations are broken up into groups which for convenience are defined as zules. It is the investigation of these zules which was undertaken by the author. The conclusions of several previous investigators upon this subject are indicated to be erroneous.—*Journal of Franklin Institute*, August, 1927.

N.E.M.A. Handbook of Radio Standards. — A reference work of practical information concerning the manufacture, test and performance of radio products. Commonly accepted definitions used in radio engineering and operating work and adopted as standard by the National Electrical Manufacturers' Association are arranged in the first part of this booklet. Sections are devoted to transmitters, receivers, battery and socket-power units and to the various kinds and classifications of vacuum tubes. The appendixes include illustrations of standard radio symbols, Underwriters' Laboratories specifications for power-operated radio-machine appliances and a preliminary draft of reports of sub-committees on vacuum tubes, receiving sets and similar devices. — *National Electrical Manufacturers' Association*, 1927.

Miscellaneous

Aging of Soft Rubber Goods.—R. F. TENER, W. H. SMITH AND W. L. HOLT. —In this investigation typical rubber compounds were prepared and subjected to different conditions of exposure, etc., in order to determine the influence of various factors such as light, heat, oxygen, moisture and the degree of vulcanization upon the deterioration of rubber goods. The rate of deterioration was measured by tensile tests which were made at varying intervals of time. It was found that, although all the factors stated contribute to the aging effect, not all rubber compounds are affected to the same degree. For example, certain compounds were found to be resisant to heat but not to light, while in other compounds the reverse was found to be true. Comparisons have been made between the results of accelerated aging tests and natural aging. — *Technologic Papers of Bureau of Standards.*

Test of Transformer Oils.—F. BEUVELOT. — The author is primarily concerned with tests to determine the tendency of transformer oils to form sludge or deposits. The discussion proceeds along the chemical lines, and the structure of the atoms of saturated and unsaturated hydrocarbons composing mineral oils offers the basis for consideration. Special apparatus was devised in order to illustrate in the laboratory the truth of the theories promulgated. — *Bulletin de la Société Alsacienne de Constructions Mechaniques*, July, 1927.

Design of Electric Battery Vehicles. —L. W. DE GRAVE.—The author enumerates the various advantages attendant upon the use of electric trucks and endeavors to suggest points of design which by incorporation or adjustment will permit this type of vehicle to supply even more satisfactory service. The question of type of drive receives particular consideration in connection with comparative consumption of energy and reliability of service. — *Electrician (England)*, Aug. 5, 1927.

News of the Industry

Colorado River Conference Deadlocked

First Week's Sessions End Fruitlessly, but Governors Reassemble and Hope Is Expressed that an Eleventh-Hour Solution Will Be Found

WEDNESDAY afternoon, Aug. 31, saw the Colorado River conference at Denver still in session after ten days of discussion. When it adjourned at the end of last week it had thus far proved barren of results, and it was generally supposed that it would not reassemble. But since then a proffered solution of the problem, based on the separation of the water problem from that of hydro-electric development, has given rise to optimistic predictions on the part of the upper-basin representatives, and the conference was called together again. Hope is felt that if a division of the water satisfactory to Arizona can be arranged, she will waive her opposition to the separation of the two phases of the situation.

All seven of the Governors of the Colorado River Basin states—Hunt of Arizona, Young of California, Adams of Colorado, Balzar of Nevada, Dillon of New Mexico, Dern of Utah and Emerson of Wyoming—together with other accredited representatives, got together at this conference in another effort to arrive at an agreement concerning the control and development of the Colorado River that all could accept. Governor Dern of Utah was elected permanent chairman and Sterling B. Lacy of Denver permanent secretary. Governor Hunt of Arizona, the original dissentient state and the only one that did not in the first instance accept the seven-state treaty negotiated at Santa Fe, N. M., nearly five years ago, put the following terms before the conference:

1. That Arizona will accept the Colorado River contract as agreed upon at Santa Fe if and when the same is supplemented by a subsidiary compact, which will make definite and certain the protection of Arizona's interests.
2. That before regulation of the Colorado River is undertaken, Mexico be formally notified that this country reserves for use in the United States water made available by storage within the United States.
3. That any compact dividing the waters of the Colorado River and its tributaries shall not impair the rights of the states under their respective water laws to control the appropriation of water within their boundaries.
4. That the waters of the tributary streams of the Colorado River system entering the river below Lee Ferry, and which are inadequate to develop their own valleys, be reserved to the states in which they are located.
5. That the water of the main Colorado River which is physically available in the lower basin (but without prejudice to the rights of the upper basin states) shall be legally available to and divided between Arizona, California and Nevada, as follows: (a) To Nevada, 300,000 acre-feet; (b) the remainder, after such deductions as may be made to care for Mexican lands, which may be allotted by treaty, shall be divided equally between Arizona and California.
6. That the right of the states to secure revenue from and to control the development of hydro-electric power, within or upon their boundaries, be recognized.
7. That encouragement will be given on the above conditions to either public or private development of the Colorado River at any site or sites harmonizing with a comprehensive plan for the maximum development of the river's irrigational and power resources.
8. That Arizona is prepared to enter into a compact at this time to settle all of the questions enumerated herein, or Arizona will agree to forego a settlement of items 6 and 7, and make a compact dividing the water alone, provided it is specified in such compact that no power plants shall be installed in the lower basin portion of the main Colorado River until the power question is settled by a compact between the states.

Governor Dern of Utah emphasized the right of every state to control its own resources, urging that the seven states settle the problem among themselves and protesting against encroachment by federal bureaus. His views elicited outbursts of applause.

California's Stand

Governor Young of California then said: "I believe that, since Arizona and California have not come to an agreement, the facts as to our respective necessities should be settled for us by disinterested parties, in consideration of Arizona's becoming a party to this seven-state compact. I, therefore, propose that, after the four upper basin states have received the 7,500,000 acre-feet which the compact grants them in perpetuity to care for their possible future needs, after Nevada has been given her 300,000 acre-feet, after Arizona has been granted all the water for irrigation and domestic uses she can take out of her tributary streams, after the perfected rights of Arizona through existing irrigation uses have been satisfied and the same has been done for California—that, after all these things have been effected, the relative percentages of the remaining flow of the Colorado be equitably apportioned between Arizona and California according to whatever practicable and economic use each state can make of the water."

Subsequently California submitted a plan for a fifty-fifty division of the water with Arizona after Nevada and old Mexico were taken care of, with the provision that after twenty years the water of the main Colorado River apportioned to Arizona and not in use at that time should be made available for use in California or in Arizona as rapidly as either state could apply it to the arid lands. An effort was made to change the period stated from twenty to forty years, but Governor Hunt, asserting that the division proposed was really a seventy-thirty, not a fifty-fifty one, would not accept the proposal even with the suggested change.

On Aug. 25 in secret session the Governors of Utah, Colorado, New Mexico and Wyoming worked out a "compromise" agreement by the terms of which California would receive a grand total of 4,137,500 acre-feet of water in the Colorado River, including her perfected rights, which aggregate about 2,000,000 acre-feet, and Arizona would receive 3,062,500 acre-feet and in addition have perpetual rights to all the water of her own tributary streams, estimated at 3,500,000 acre-feet. This proposal proved unacceptable to California, and Governor Hunt declared that even if California were to accept it, Arizona would not ratify the seven-state compact until other points had been settled.

Further proposals and argument had no tangible results, and thus the first week's conference utterly failed either to arrive at an acceptable modification of the Santa Fe compact or to advance the Swing-Johnson Boulder Dam bill.

The secret sessions were condemned by some observers, and a direct charge was made by Congressman Edward T. Taylor of Colorado that the "electric power trust" by its secret agents had successfully blocked all efforts at compromise.

National Utility Associations Discuss Boulder Dam

With the object of reducing the question to understandable terms, the Joint Committee of National Utility Associations, which represents the national electric light, railway and gas associations, has issued two publications relating to the Swing-Johnson bill, defeated in the last Congress and scheduled to come up for consideration at the forthcoming session of the new Congress. One is a booklet entitled "The Boulder Canyon Dam" and is an analysis of the Los Angeles water and power measure, as the Swing-Johnson bill is known in California. The other, entitled "Boulder Dam," is a comprehensive compilation of esssential data which have been assembled by governmental and other authoritative agencies.

In issuing those publications it is the announced aim of the Joint Committee to place in the hands of the public exact and authentic information concerning an issue which has been clouded by misconceptions and inaccuracies. The larger volume contains five government charts illustrating how it is pro-

posed to construct a dam 550 ft. high in Boulder Canyon on the Colorado River with the ostensible main object of controlling the floods of the Colorado and irrigating Imperial Valley. The measure also provides for the development of a million horsepower of electrical energy "so that," the committee says, "Los Angeles may receive exceptionally cheap electricity and an extraordinary water supply at the expense of the rest of the country."

The committee maintains that flood protection and irrigation can be effected more expeditiously and at considerably less cost by a lower and relatively inexpensive dam further down the river. Without the aqueduct or power transmission lines the Boulder Dam project, it says, will cost at least $200,000,000. With those additions the public cost may run well above that of the Panama Canal. Lined up with the California delegation behind the bill in Congress are the advocates of government ownership and operation of public utilities. Those opposed to the bill believe that were the project a feasible enterprise and could it be made a commercial success, ample private capital would be available to build and operate it.

Edgar's Fortieth Anniversary Commemorated at Boston

On Thursday of this week the fortieth anniversary of President Charles L. Edgar's connection with the Edison Electric Illuminating Company of Boston was signalized by messages of congratulation and good will from many leaders of the industry and by appropriate observances within the organization itself. The program included a reception in the auditorium of the company's service buildings in Boston to which all members of the Gold Button Club (representing twenty or more years' service) were invited, with officers, directors, department and division heads and assistants, and a complimentary dinner at the Engineers' Club of Boston given Mr. Edgar by office and bureau associates.

At the reception, which took place after the ELECTRICAL WORLD closed its forms, it was planned that C. S. Hadaway, president of the Gold Button Club, should present Mr. Edgar with a forty-year service pin, followed by reminiscences by La Rue Vredenburgh. It was then expected that Mr. Edgar would be the recipient of an English lounging chair and bronze floor lamp, given by voluntary subscriptions on behalf of the 3,500 employees of the company, Vice-president W. C. Baylies being spokesman. At the dinner Mr. Baylies was also scheduled to present the guest of honor with a mahogany Telechron clock equipped with Westminster chimes, this gift being the first of its kind to be produced by the Electric Time Company. Many of Mr. Edgar's friends in business and in the engineering profession called at the executive offices of the company to offer their felicitations. A warm congratulatory message came from Thomas A. Edison. Messages were also received from Elihu Thomson, H. T. Sands, O. D. Young, N. F. Brady, Samuel Insull, E. M. Herr, Gerard Swope, J. W. Lieb, Alex Dow, W. C. L. Eglin, W. S. Barstow, E. A. Barrows and many other leaders in the industry.

Heads of Four Associations Join Hands

Presidents and Managers of National Central-Station, Manufacturers', Inspectors' and Jobbers' Bodies, Speaking at Association Island, Encourage Local Leagues

GROWING importance of the local league in the organization of the electrical industry received conspicuous recognition this week at the annual conference of league representatives, who gathered on Sunday at Association Island, Henderson Harbor, N. Y., for Camp Co-operation VII. At the opening session H. T. Sands, president National Electric Light Association; Gerard Swope, president National Electrical Manufacturers' Association; W. W. Freeman, president Society for Electrical Development, and O. Fred Rost, speaking for G. E. Cullinan, national chairman of the Electrical Supply Jobbers' Association, discussed the relationship of these national associations to the league movement. Laurence W. Davis, general manager of the Association of Electragists International, brought a similar message from C. L. Chamblin, president of that organization, and at a later meeting, in company with Paul S. Clapp, managing director N.E.L.A.; A. E. Waller, managing director N.E.M.A., and Mr. Rost, speaking for the E.S.J.A., presented in detail a picture of the organization programs and the objective of these four major branches of the industry, this being the first time that the organized industry has come together in open forum on the basis of equality of interests.

Mr. Freeman described the reorganization of the Society for Electrical Development through the election of the chief executives of the four major national associations and their managing directors to the society directorate and announced the completion of the refinancing of the society by an issue of bonds sufficient to pay all debts and establish the organization with sufficient working capital to provide for future activities. These bonds have been subscribed entirely by those companies that have been actively supporting the society in the past. The time has come, he said, when the electrical industry can no longer depend on easy growth. It is in active competition today with other industries, striving for the largest possible share of the household budget, and is entering an era of intensive marketing which must be conducted locally. Therefore the new machinery of the reorganized society is being set up for the use of the industry in this expanded marketing enterprise.

The conference this year was presided over by J. E. North, chairman of the League Council, and opened with a flag address by Walter Drey, general manager of *Forbes Magazine*. Morning and evening meetings for three days were devoted to the discussion of the practical problems of the league. Earl Whitehorne, commercial editor of the ELECTRICAL WORLD, presented a background picture of the diminishing market for house wiring and the urgent need for a national sales program to insure the installation of adequate wiring in the homes so that facilities may be provided for the use of complete electrical equipment. Discussion of the experience of the many leagues now using the "red seal" plan disclosed the confidence of the leagues in the fundamental value of this method of stimulating a higher standard of adequacy in house wiring.

A report on the present status of the proposed national refixturing campaign which has been initiated by the N.E.L.A. home-lighting committee and a review of the plans of the Chicago, Minneapolis and Cleveland leagues for an immediate refixturing activity were followed by the adoption of a resolution indorsing the idea of a national refixturing campaign provided that it is conducted as a coordinated part of a broad rewiring campaign supported by the national associations of the industry and clearing through the Society for Electrical Development.

The following men were elected by caucuses representing the thirteen geographic sections of the United States and Canada to serve as the League Council for the coming year:

District*	Representative Councilor	Representatives at Large
1	J. J. Caddigan, Boston	R. A. Gordon, Pawtucket
2	D. C. Burdsall, Philadelphia	1. E. A. Roeser, Rochester 2. E. Whitehorne, New York
3	J. E. North, Cleveland	P. G. Vondersmith, Cincinnati
4	H. A. Brooks, Washington	None
5	G. T. Marchmont, Atlanta	A. B. Collins, Birmingham
6	R. Bourke, Chicago	1. T. R. Bode, Milwaukee 2. To be selected
7	J. S. Hogan, Minneapolis	To be selected
8	A. E. Bettis, Kan. City	G. B. Adam, St. Louis
9	W. E. Clement, New Orleans	C. W. Davis, Dallas
10	J. J. Cooper, Denver	To be selected
11	To be selected	To be selected
12	To be selected	To be selected
13	E. M. Ashworth, Toronto	1. J. G. Glassco, Winnipeg 2. James Lightbody, Vancouver

* District No. 1, New England; 2, Eastern; 3, East Central; 4, Middle Atlantic; 5, Southeastern; 6, Great Lakes; 7, North Central; 8, Middle West; 9, Southwestern; 10, Rocky Mountain; 11, Northwestern; 12, Pacific Coast; 13, Canadian.

J. E. North was re-elected chairman and Earl Whitehorne vice-chairman of the Council. It was announced that a midwinter meeting of the league officers and managers will be held in Chicago in January.

New N.E.M.A. Plan

Need for a Commercial and a Technical Division in Lieu of Present Divisions Suggested by Clarence L. Collens at Association Island.

ON THURSDAY, Sept. 1, the Policies Division of the National Electrical Manufacturers' Association met at Association Island, and on that day Clarence L. Collens, vice-president in charge of the Policies Division, spoke on "How to Make the N.E.M.A. a Paying Investment." Mr. Collens pointed to the need that the executives of the industry as a whole should give appreciably of their time, experience and judgment to the problems of the industry and to the development of a constructive program for the future. A brief review of what the N.E.M.A. has done and is doing was presented, and in order to accomplish the desired results more effectively and bring maximum returns Mr. Collens said it was necessary to reorganize the organization itself.

Mr. Collens suggested that the association should operate more along functional lines, starting with the Policies Division, and that divisions representing classes of apparatus or supplies were not required. Rather than an Apparatus Division and a Supply Division, a Commercial Division and a Technical Division were suggested, all to meet as one with the Policies Division once a year at the time of the annual meeting. Elaborating this idea, Mr. Collens said: "The basic idea of sections and of divisions would still be retained, but it would start with the executives in the Policies Division and be supplemented by the commercial men in the Commercial Division and by the engineers in the Technical Division. Policies and specific programs would be developed by the right group of executives in the Policies Division, and then if necessary referred to the right group of men in the Commercial Division or the right group of men in the Technical Division to be worked out."

Attorney-General Turner on Warpath in Ohio

Attorney-General Edward C. Turner of Ohio, whose attack on public service commission control of utility companies attracted attention a few weeks ago and was noticed in the ELECTRICAL WORLD for Aug. 13 (page 325), is keeping up his fight on what he considers wrong conduct on the part of the companies, accusing those in his own state of combining with the Anti-Saloon League to lobby in the Legislature by a system of bargaining.

Mr. Turner, who declares that he is not a "corporation baiter," is particularly severe on what is known as the Pence law, which, he declares, "is an unfair law, enacted at the behest of the public utilities of the state, which authorizes the public utilities to collect from the public any rate the utility chooses so long as it gives bond to pay back any excess which the courts may thereafter find unjustified. That is, the utilities will pay back the excess if, when and as the customers are able to put up sufficient fight to get it back."

Water Storage Brings Another Suit in California

Suit was filed in the Superior Court of Fresno County, Cal., on Aug. 25 by Miller & Lux, Inc., asking that a permanent restraining order be issued to enjoin the San Joaquin Light & Power Corporation from depreciating the flow of the San Joaquin River by accumulating water behind the Kerchhoff Dam when the river flow is less than 3,000 sec.-ft. at the gaging station at Lone Willow Slough. This action is based upon an agreement entered into Sept. 16, 1919, whereby Miller & Lux as riparian owners agreed to allow the power corporation to accumulate water behind the dam for power purposes during periods when the river had a flow of more than 3,000 sec.-ft. at the Lone Willow Slough gaging station. The complaint charges that during the late summer and fall of 1926 the power company actually impounded 3,500 acre-feet of water behind the dam at a time when less than 3,000 sec.-ft. was flowing in the river and that this same situation has been found to exist during two other periods of low water, one of which occurred within the last month.

Miller & Lux, Inc., are the owners of 185,000 acres of land riparian to the San Joaquin River. The complaint was filed by J. Earl Woolley, former Superior Judge of Fresno County, who was the author of the Herminghaus-Southern California Edison Company decision involving riparian rights.

Hartford Company Declares "Customer Dividend"

The Hartford (Conn.) Electric Light Company has voted a 40 per cent reduction on the October bills of its sixty-odd thousand customers. A statement issued by President Samuel Ferguson explains the so-called customers' dividend, which was inaugurated three years ago.

"It has been the consistent policy of the company to collect from its customers only such amounts above its operating expenses as are sufficient for its interest and dividend requirements, together with a moderate annual increase of surplus," Mr. Ferguson says. "In accordance with this policy the directors have voted to distribute this year a customer dividend of 40 per cent on their October bills. This dividend is less in amount than the 60 per cent discount voted last year, for the reason that material deductions in household and other rates were made last January. These reductions have decreased the amount of surplus above dividends earned from the sale of electricity to date this year, as compared with that of last year, to a degree which justifies only the smaller dividend."

Purchases and Mergers

Springfield Company May Join Western Massachusetts Group — Minor Transactions in Eastern, Middle Western and Southern States

PLANS have been completed under which the United Electric Light Company, Springfield, Mass., will join the group of utilities controlled by the Western Massachusetts Companies, on the basis of an exchange of two and one-half shares of the Western companies' stock for each share of United turned in. The offer was sent to United company stockholders on Monday of this week. The United company is one of the best-known central-station service organizations in New England, and for over a year active efforts have been in progress from various quarters to obtain its control. Affiliated with the Western organization are the Turners Falls Power & Electric Company, Greenfield Electric Light & Power Company, Pittsfield Electric Company, Ludlow Electric Light Company, Lee Electric Company, Agawam Electric Company, Amherst Gas Company and Easthampton Gas Company, the two last named having electric departments. The United company has outstanding 160,000 shares of $25 par value stock. In 1926 the net sales of electricity and gas of the Western companies totaled $4,598,000 and the electrical energy sales of the United company $3,231,158. More than 180,000 customers are included in the various properties and the territory served by the combination has a population of about 700,000.

The Danbury (Conn.) Power & Transportation Company has applied to the Public Utilities Commission of Connecticut for authority to sell its franchise rights for the generation of electricity, as well as its power plant and equipment, to the Danbury & Bethel Gas & Electric Company.

The Hill (N. H.) Light & Power Company, which is owned by Frank R. Woodward, is soon to be purchased by Prof. Arthur S. Dewing, owner of electric power plants at Jackson and Salem in New Hampshire. The matter is still before the Public Service Commission, but at a recent hearing no opposition was recorded.

A certificate filed in the office of the Secretary of State of New York records that the Windham Valley Electric Company has been merged with the New York State Gas & Electric Corporation.

The Empire Gas & Electric Company of Geneva, N. Y., has made application to the Public Service Commission for approval of the merger with it of the Seneca Power Corporation of Seneca Falls. The Seneca Power Corporation now generates electricity which is sold to the Empire company.

The Harmony Light & Power Company has sold its rural lines near Spencer, Iowa, to the Iowa Public Service Company of Fort Dodge for $9,000.

A contract has been signed whereby the Maryville (Mo.) Electric Light & Power Company will purchase the property of the King City Electric & Manu-

facturing Company, subject to commission approval. The King City concern owns distribution systems in King City and Whitesville, Mo., and a transmission line from King City to Rosendale.

The sale of electric generating plants at Dierks, Nashville, Murfreesboro and De Queen, Ark., to the Southwestern Gas & Electric Company of Texarkana is reported by a Little Rock newspaper as tentatively agreed upon. The Southwestern Gas & Electric Company is an Insull company. The plants at Hugo, Broken Bow and other Oklahoma towns near the Arkansas border are said to be included in the transaction. Those at Hugo and Broken Bow are already controlled by Insull companies operating in Oklahoma.

The Exmore (Va.) Power & Light Company, subsidiary of the General Engineering & Management Corporation of New York, has just taken over the electric lighting and power equipment of the town of Cape Charles, Va., having purchased the franchise early last spring.

Farmville, Va., has refused an offer of $305,000 from a private utility company for its municipal plant. This plant is bonded for $106,000, and its replacement value is estimated at $232,000.

The Pea River Power Company, which supplies electricity to Troy, Elba and seven other towns in southeast Alabama from small hydro and steam plants, has been sold by former Governor Charles Henderson to Colonel C. A. O'Neal.

Permission has been granted by the Tennessee commission for the sale of the Gallatin municipal light and water plant to the Kentucky-Tennessee Power Company.

Mackay Adopts Radio

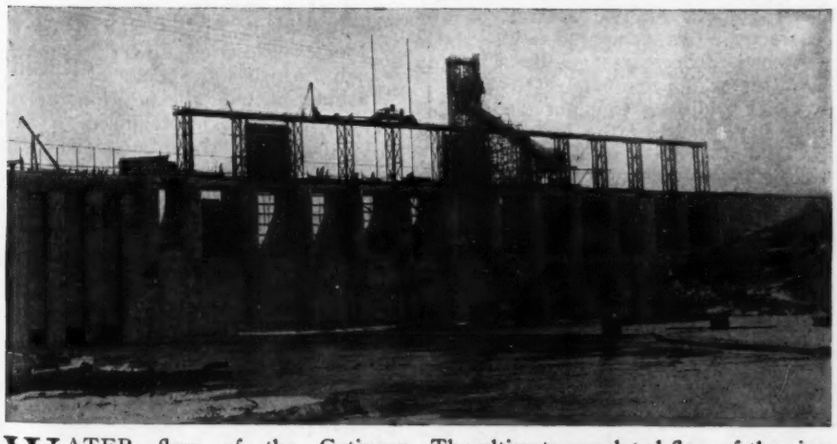
Cable System Purchases the Federal Telegraph Company and Will Build World-Wide Communication System by Cable, Wire and Wireless

RADIO communication will in the near future be used by the Mackay Companies as an auxiliary to their present commercial communication system, to provide complete land telegraph, ocean cable and land and ocean radio service, according to an announcement made last week by Vice-president George V. McLaughlin of the Mackay Companies. Not only will the radio be used to span the Pacific Ocean, he explained, but it will be employed in the development of a point-to-point communication service within the United States, supplementing existing land wires.

The Mackay Companies have signed a contract for the acquisition by their subsidiary the Radio Communication Company of the Federal Telegraph Company, which now operates a point-to-point and ship-to-shore radio service on the Pacific Coast, whereby the Macay Companies will have the right to use and to expand the Federal radio system and use radio apparatus manufactured under Federal and other patents. The Federal company controls the development of the long-wavelength arc system of radio transmission, which has been found advantageous for long-distance communication, and has rights in the De Forest and other patents on short-wave transmission for use in the point-to-point service. The company also has a research laboratory and engineering system, which are engaged in television, facsimile and photo-electric telegraphy and telephony.

The first step in this radio expansion of the Mackay System is the purchase of the Federal Telegraph's Company's present land and marine radio-telegraph system on the Pacific Coast at a purchase price representing a profit of $1,000,000 to the Federal company. It is expected that the properties will be transferred within the next 30 to 60 days. Under the terms of the contract the Mackay System is obligated to purchase solely from the Federal company all of the radio, wired-radio, picture-transmission and fac-simile telegraph equipment which the Mackay System will require in its expansion and extension of its present communication system. In addition, the Federal company will manufacture for the Mackay System all of the telephone repeater equipment which the Mackay System shall require in the building up of its long-distance telephone service. All such equipment manufactured by the Federal company for the Mackay System will be sold to the Mackay System on a basis of cost plus 25 per cent profit to the Federal company.

Mercier Storage Reservoir Will Rank with Largest



WATER flow of the Gatineau River, in Quebec Province, upon which the gigantic power development system of the Gatineau Power Company is being established, comes under control about 130 miles above the mouth of the river. At that point the Mercier storage dam is being built under the direction of the Quebec Streams Commission. The reservoir formed by the dam will have an estimated storage capacity of ninety-five billion cubic feet. The ultimate regulated flow of the river has been estimated to be between 10,000 cu.ft. and 11,000 cu.ft. per second. This reservoir above the Mercier Dam will rank in size among the three or four largest artificial storage reservoirs in the world, being exceeded by the lake above the Gatun Dam in the Panama Canal Zone, that above the Gouin Dam on the St. Maurice River in Quebec, and probably by the Elephant Butte reservoir in New Mexico.

Washington State Projects

Hugh L. Cooper Applies Again for Right on Clark Fork of Columbia River—Plan to Develop North River Near Aberdeen

HUGH L. COOPER of New York has applied again to the Federal Power Commission for a preliminary permit covering the "Z" Canyon project on the Clark Fork of the Columbia River in Pend Oreille County, Wash., where he proposes to install ultimately twelve 50,000-hp. units under a head of 245 ft. The initial installation would be six 50,000-hp. units. Nearly 200,000 hp. of primary power can be developed at the site, Colonel Cooper estimates. A prior application was rejected by the commission because the applicant was unable at that time to find a market for the power and because of his inability to secure state rights. In the meantime Colonel Cooper has reached an understanding with certain electrochemical manufacturers. In addition to the manufacturing load a part of the power can be utilized for public utility purposes. The State of Washington would not approve the first application for rights because of the status of the Columbia Basin project. Requirements of that development are now much better understood, and Colonel Cooper is hopeful of securing the necessary state authority to proceed.

The Twin Harbor Land Company of Aberdeen, Wash., has applied for a preliminary permit covering a project on North River near Aberdeen. It is proposed to construct a dam 115 ft. high which would create a reservoir covering 7,500 acres. North River is technically navigable, but as no navigation exists or is likely to exist, it was suggested to the applicant that a declaration of intention be filed as there is a possibility that the commission would not take jurisdiction. This advice was not taken.

Syndicate Company's Rejoinder

Holds that Its Plans for Development of the Colorado River of Texas Will Be of Great Benefit Save to One Small Area

CONTROVERSY between the Syndicate Power Company and irrigation interests over water rights on the Colorado River of Texas and its tributaries has, as reported last week on page 428, brought the whole question of the equable distribution of the normal flow of the streams of the state to public attention. Governor Moody has been urged by opponents of the Syndicate Power Company's project to call a special session of the Legislature to enact laws to assure the conservation of water for irrigation and domestic purposes. The Syndicate Power Company has obtained water rights on the Colorado River and permits from the State Board of Water Engineers for the construction of six dams and hydro-electric plants along the stream north of Austin at an estimated eventual cost of $25,000,000. A protest from persons interested in obtaining water rights on Pecan Bayou, tributary of the Colorado River, for irrigation and domestic purposes may lead to a rehearing of the applications if the Attorney-General holds that this can be done legally. In the meanwhile the Syndicate Power Company has temporarily discontinued the surveys and preliminary construction work upon its first dam, 6 miles north of Kingsland. It has paid more than $100,000 for the purchase of land that is to be submerged by the reservoirs.

Jay Alexander of Dallas, secretary of the Syndicate Power Company, in a statement just issued, explains the relations existing between the company and the Middle West Utilities Company, owned by the Insull interests of Chicago. He said:

"My company has contracted to sell its rights on the Colorado River to the Middle West Utilities Company, subject to certain conditions. If this contract is carried out, the Middle West Utilities Company has made its plans to construct the necessary improvements in Travis, Burnet and Llano Counties, at an ultimate cost of about $25,000,000. These improvements, when constructed, will afford protection to the city of Austin and all other towns and farm lands on the lower Colorado River and will store the flood waters for use as needed by all the irrigation districts on the lower river. If this project is carried out, it will benefit, directly and indirectly, hundreds of thousands of Texas people; but this great project has been attacked by the Brown County Irrigation Company because it will interfere with the irrigation of a comparatively small area of land on the Colorado River watershed above Burnet County. This attack is made regardless of the undisputed fact that the project, if constructed, will afford water for the irrigation of hundreds of thousands of acres of land in the watershed below Brown County, where elaborate waterworks, canals, laterals and diversion works have been in operation for many years.

"The charge has been made by the Brown County Irrigation Company that my company objects to the city of Brownwood building a reservoir to store water for municipal and domestic purposes. My company has made no such objection; on the contrary, there has been filed for several weeks with the Board of Water Engineers a brief by my attorneys in which it is emphatically stated that the Syndicate Power Company is willing for Brownwood and its inhabitants to have the use in abundance of the waters of the Colorado River for all necessary municipal and domestic purposes."

Resolutions have been adopted by the chambers of commerce of Austin, Burnet, Marble Falls and other towns of central Texas urging the Middle West Utilities Company to carry out its proposed contract with the Syndicate Power Company for the construction of the dams and hydro-electric plants.

Tennessee Electric Power Reviews Five Years

More than $25,000,000 has been invested by the Tennessee Electric Power Company in the last five years in its program of power development and distribution throughout middle and east Tennessee, according to a summary of a survey recently made public by the company. Since 1922 the company has increased the capacity of its system by 70 per cent, numerous high-voltage lines have been erected throughout the territory and more than 100 communities have been added to the system, nearly half of which had previously been without electric service of any character. As compared with 50,000 customers five years ago, the company now serves approximately 90,000.

Chief additions to plant during this time have included the building of the 53,620-hp. steam station at Hales Bar on the Tennessee River, raising the dam and enlarging by 22,510 hp. the facilities of the Great Falls development at Rock Island in middle Tennessee, and increasing the capacity of the Nashville steam plant by 24,630 hp. The present rated system capacity is 294,975 hp., divided almost equally between hydro-electric and auxiliary steam-electric plants. Transmission lines built include a 120-kv. line from Cleveland to Knoxville, a 120-kv. line from the Ocoee River plants to Chattanooga, a 120-kv. line from Chattanooga to the Georgia Power Company at the state line for interchange of energy, a 66-kv. line from the Arlington substation near Knoxville to Coal Creek to serve the extensive coal-mining business in the northern counties of the state, a 44-kv. line from Hales Bar to Richard City to serve the Pennsylvania-Dixie Cement Corporation and a 44-kv. line from Lebanon to Carthage.

Warm Debate Over Potomac River

Opponents of Plant Muster at Hearings in Harpers Ferry and Washington—Promoters Plead for Suspension of Judgment

WIDESPREAD opposition to the proposed hydro-electric development of Great Falls, in the Potomac River, just adjoining the national capital, was voiced by Washingtonians and residents of nearby Maryland and Virginia at hearings held on Aug. 24 and 25 at Harpers Ferry, W. Va., and in the auditorium of the Interior Department, Washington, before Major Brehon Somervell, representative of the Federal Power Commission. The opposition was based principally on the fear that power dams and reservoirs would mar the scenic beauty of the river and doubts as to whether the people of Washington would receive any compensating benefit in the way of reduced light and power rates. The hearings were largely attended, and the discussion waxed warm.

General Charles Keller, representing the Byllesby Engineering & Management Corporation of Chicago, and Robert J. Bulkley, president of the Potomac River Corporation, which seeks a preliminary permit for the development, appeared for the promoters, and a number of residents of Washington and nearby Virginia and Maryland spoke in support of the petitions opposing the project, which emanated from a dozen or more organizations interested in park promotion and preservation of scenery. Among leading opponents was Colonel U. S. Grant, 3d, who spoke for the National Capital Park and Planning Commission. The Washington Board of Trade opposed the plan unless it involved a reduction in power rates. Vice-president S. R. Bowen of the Potomac Electric Power Company, which furnishes the electric supply of Washington, took the position that the applicant should be required to show what public use would be served by the project. The Potomac Edison Company, Hagerstown, was another opponent.

The Potomac River Corporation's reply to the argument of the scenery conservationists was printed in these columns last week (page 427). Its representatives pleaded for permission to go on with the survey and for a suspension of judgment until their plans were complete in detail, pointing out that the issue of a preliminary permit did not commit the Federal Power Commission to final approval. Mr. Bulkley said his company has spent $110,000 in investigating the water-power resources of the Potomac and Shenandoah Rivers and is prepared to spend from $200,000 to $500,000 more. The ultimate cost of the project, if carried out, was put at $60,000,000.

At the conclusion of the public hearing Major Somervell took the case under advisement, with a promise of a report within a month.

Wyoming Men Meet at Cheyenne

Convention of Utilities Association Holds Open Sessions—Pointed Addresses and Practical Discussions Charactèrize Gathering

ADHERING to the policy established two years ago, that of having customers and the public in general present at its sessions, the Wyoming Utilities Association, at its recent annual convention in Cheyenne, had more than a score of guests. These included Mayor Riner, who declared that the utility men had the right idea in making their affairs known to their customers and the public generally.

Several Colorado men took part in the proceedings, including Clare N. Stannard, vice-president; V. L. Board, general superintendent, and George Shaw, general counsel, Public Service Company of Colorado; W. C. Sterne, president Rocky Mountain Division, N.E.L.A., and George E. Lewis, Rocky Mountain Committee on Public Utility Information. Mr. Shaw spoke on "Government in Business," asserting his conviction that "whether other industries know it or not, the public utilities are now fighting their battle, to stave off the socialization of their business." Mr. Sterne decried the apologetic attitude assumed by so many public utility representatives. He held that the public utilities of the nation probably have less to apologize for as an industry than any other line of business. "While I do not believe the public utilities should get into politics," said Mr. Sterne, "I do believe they have just as much right to protect their interests, which, after all, are the interests of the people they serve. This should be done boldly and aboveboard."

Others who participated in the varied and practical discussions, which greatly outnumbered the talks and papers, were M. H. Soulé, Western Public Service Company, Laramie; W. D. Johnson, Mountain States Power Company, Casper; J. J. Withrow, Sheridan County Electric Company, Sheridan, and H. L. Williams and J. J. Jacabucci, Utah Light & Power Company, Evanston and Green River.

J. G. Keegan, Cheyenne Light, Fuel & Power Company, was elected president of the association; W. D. Johnson, Mountain States Power Company, first vice-president; M. H. Soulé, Western Public Service Company, second vice-president, and L. J. Meyer, Mountain States Telephone & Telegraph Company, Cheyenne, secretary-treasurer.

Electrochemists to Take Trip to the Northwest

A trip to the Northwest, terminating at Vancouver, B. C., will be made by the American Electrochemical Society, starting by special train from Chicago on next Monday, Sept. 5, and returning on Sept. 21. Scientific sessions will be held at Minneapolis, the first stop; Vancouver and, on the return journey, at Keokuk, Iowa. Mines, smelters and refineries at Trail, B. C.; Wallace and Kellogg, Idaho; Anaconda, Butte and Great Falls, Mont., are to be visited as well as industrial plants and power developments at Spokane, Seattle, Vancouver and Keokuk; the 7-mile tunnel now being bored through the Cascade Mountains and the oil fields at Shelby, Mont. One day will be spent at Glacier National Park. The electrodeposition of rubber, thin-film rectifiers, a laboratory hydrogen-oxygen generator and the structure of electrodeposited copper are among the subjects to be treated at the three technical sessions.

Briefer News

LITTLE ROCK UTILITY RATES UNDER FIRE.—The City Council of Little Rock, Ark., has ordered the city attorney to ascertain the approximate cost of a thorough investigation of the public utility rates in that city. Mayor Moyer believes that the utility rates charged in Little Rock are excessive and higher than the rates of other cities of approximately the same size.

CHATTANOOGA HAS BIG SEARCHLAMP.—An 8,000,000-cp. revolving-beam light has been placed on the roof of the Chattanooga (Tenn.) Savings Bank & Trust Company building, now nearing completion. Energy is supplied from the lines of the Tennessee Electric Power Company. The beacon is of the type used in the United States Air Mail Service and was manufactured by the General Electric Company. Under normal conditions its light can be seen for 25 miles.

MORE INTERCONNECTION IN VIRGINIA.—The lines of the Page Power Company and the Shenandoah River Power Company are being interconnected at Shenandoah, Va., whence a line will run to Harrisonburg. The Page Power Company recently completed a hydro-electric dam on the Shenandoah River, near Luray, as a supplement to the dam erected several years ago at Newport. This new plant has been tested and found in excellent condition.

"LENGTHENING OF NIAGARA FALLS."—Under this title the Buffalo, Niagara & Eastern Power Corporation has issued an artistic booklet with colored and halftone illustrations in advocacy of the engineering plan for counteracting the recession of the Horseshoe Falls by a series of underwater dams in the rapids above the Horseshoe and a series of artificial islands scattered through the main channel. The booklet, which is written in popular language for the layman, gives also a succinct account of electrical development at Niagara on the American side.

N.E.L.A. EXECUTIVE MEETINGS.—There will be a meeting of the executive committee of the Public Relations National Section, N.E.L.A., at the Edison Building, Chicago, on Sept. 20, and a meeting of the national executive committee in the same place on the following day.

TO ENLARGE CLINTON (MO.) PLANT.—The Clinton power plant recently purchased by the Inland Power & Light Corporation of St. Louis, the Fitkin organization, is to be more than doubled in capacity by the construction of a large addition at a cost of $400,000. The Clinton plant furnishes energy to eight towns in Henry and surrounding counties.

ELECTRIC METER SHORT COURSE AT AMES.—The electric meter short course will be held at Iowa State College, Ames, Sept. 19-23 inclusive. The scheme of dividing the students into three groups last year, according to their experience, worked out so well that the same general plan will be carried through again. The three groups consist of, first, those wishing instruction only in single-phase meters; second, those wishing instruction in polyphase meters, and, third, meter superintendents or those having considerable experience in all kinds of meter work.

NEW ENGLAND PUBLIC SERVICE COMPANY MAY TAKE OVER PAPER MILLS.—The New England Public Service Company is said to have plans for a hydro-electric development in connection with a proposed purchase of paper mills near Keene, N. H. Under the proposed plan the company will buy the three mills of the Robertson Paper Company and the mill of the Paper Service Company on the Ashuelot River, between Upper Ashuelot and the Connecticut River, where penstocks will be built and used in connection with the present dams in the river.

NEW UNIT PLANNED FOR DEEP CREEK PLANT ON THE YOUGHIOGHENY.—A 12,000-hp. generator is to be added this year to the Deep Creek hydro-electric plant on the Youghiogheny River in Maryland, according to Warren Partridge, vice-president of the Associated Pennsylvania Properties in the Associated Gas & Electric System. At present the installation at Deep Creek is 24,000 hp., the same as that of the initial unit in the Penn Public Service Company's other chief water-power plant, Piney, on the Clarion River in west Pennsylvania. Both plants are ultimately to have much higher ratings with the building of additional dams.

COUNTY-OWNED PLANT AT CORDELE, GA., TO GO AHEAD.—All financial details have been completed for the county-owned hydro-electric development on the Flint River near Cordele, Ga., approved by the voters of Crisp County and sanctioned by the state at the general election last November. As reported in the ELECTRICAL WORLD at

that time, the first outlay will be $1,250,000, and it is intended to develop 14,000 hp. for industrial and domestic use. All engineering and construction work will be systematically carried on under the direction of Emmet S. Killebrew, hydro-electric engineer of Albany, Ga.

DOORS WIDE OPEN TO CRITICS OF UTILITY COMPANIES IN INDIANA.—Petitioners for a public hearing before the Indiana Public Service Commission on any utility question need not be patrons of the utility concerned if they are able to show an interest. This opinion of Arthur L. Gilliom, Attorney-General of Indiana, has been submitted to the commission in reply to a question. The ruling is considered as adverse from the utility viewpoint, since politicians in the state who for some years have consistently fought the utilities and the commission will thus find it easy to raise innumerable questions and present innumerable petitions.

SUBSTANTIAL RATE CUT FOR SOUTH DAKOTA TOWNS.—Reductions in electric light rates have been announced which will affect the many towns served by the Northwestern Public Service Company in South Dakota. These reductions amount to 30 per cent of the average rate over the whole system, and the annual saving to customers will be $200,000. The new rate for Aberdeen will range from 9 cents down to 4 cents, the minimum being granted residential consumers after 100 kw.-hr. in a month is used. The old schedule ranged from 10 cents to 6½ cents, and 500 kw.-hr. had to be metered to earn the minimum. These rates are to be effective also in Redfield, Huron, Yankton and Mitchell, where generating plants exist.

STREET-LIGHTING COSTS IN 76 OHIO CITIES. — Seventy-six Ohio cities of more than 5,000 population spent an aggregate of $3,349,386 for street lighting in 1925, according to statistics compiled in the State Auditor's office by D. O. Heeter. The figures include only those cities in which the lighting is done by contract and do not include those whose street lighting is done by municipally owned and operated plants, the latter including Columbus, Hamilton, Ashtabula and thirteen other places. The cost to the larger cities which contract for their street lighting was: Cleveland, $891,148; Cincinnati, $522,006; Toledo, $284,960; Akron, $184,384; Dayton, $126,577; Youngstown, $107,197; Canton, $76,646, and Springfield, $58,483.

PROPOSED LEGISLATION AIMED AT GEORGIA POWER COMPANIES DEFEATED. —A résumé of bills passed and bills defeated by the 1927 session of the Georgia General Assembly, which recently came to an end, shows that no measures injurious to the hydro-electric power interests in the state were carried. On the other hand, a number of measures which would have been harmful were killed, either through opposition or failure to come to a vote. These included an attempt to fix an occupational tax on sellers of radios, electric refrigerators and other articles carried by power companies, a measure which would have placed a 2-mill sales tax on articles purchased by power companies for resale, and a general measure placing a 1-mill sales tax on all merchants in the state.

MORE WATER POWER FROM THE CHICOPEE RIVER SOUGHT. — Plans for a new hydro-electric development at Indian Orchard, Mass., utilizing water power hitherto used by the Indian Orchard Company, are being worked out by the engineering department of the United Electric Light Company of Springfield, which in disposing of the common stock of the first-named concern, long held as a subsidiary, retained control of the Chicopee River power rights at that point. Particulars are not yet ready to give out.

Coming Meetings

[A complete directory of electrical associations, with their secretaries, is published in the first issue of each volume. For latest list see the ELECTRICAL WORLD for July 2, page 50.]

Eastern Division, N.E.L.A.—Bedford Springs, Pa., Sept. 7-10. H. A. Buch, 212 Locust St., Harrisburg, Pa.

New England Division, N.E.L.A.—New London, Conn., Sept. 12-15. Miss O. A. Bursiel, 20 Providence St., Boston.

Pennsylvania State Association of Electrical Contractors and Dealers—Lawrence Hotel, Erie, Pa., Sept. 12-14. M. G. Sellers, 1202 Locust St., Philadelphia.

American Institute of Electrical Engineers—Pacific Coast convention, Del Monte, Cal., Sept. 13-16. F. L. Hutchinson, 36 West 39th St., New York.

Empire State Gas and Electric Association—Electric Meter Section, Hotel Syracuse, Syracuse, Sept. 15-16; annual convention, Lake Placid Club, Lake Placid, N. Y., Oct. 6 and 7. C. H. B. Chapin, Grand Central Terminal, New York.

American Welding Society — Book-Cadillac Hotel, Detroit, Sept. 19-23. M. M. Kelly, 29 West 39th Street, New York.

New England Central Station Association of Power Engineers—Chamber of Commerce, Boston, Sept. 21. T. D. Bond, 200 Devonshire St., Boston.

Great Lakes Division, N.E.L.A. — French Lick Springs, Ind., Sept. 22-24. R. V. Prather, 205 Illinois Mine Workers' Bldg., Springfield, Ill.

Association of Edison Illuminating Companies—Colorado Springs, Col., Sept. 26-30. P. S. Millar, 80th St. and East End Ave., New York.

International Association of Electrical Inspectors, Western Section—Toronto, Canada, Sept. 27-29. W. S. Boyd, 175 W. Jackson Blvd., Chicago.

American Electric Railway Association—Cleveland, Oct. 3-7. J. W. Welsh, 292 Madison Ave., New York.

Illuminating Engineering Society — Edgewater Beach Hotel, Chicago, Oct. 11-14. L. H. Graves, 29 West 39th St., New York City.

Eastern Association of Electrical Inspectors — Springfield, Mass., Oct. 12-13. E. P. Slack, 85 John St., New York.

Rocky Mountain Division, N.E.L.A.—Broadmoor Hotel, Colorado Springs, Col., Oct. 17-20. O. A. Weller, 900 15th St., Denver.

National Association of Railroad and Utilities Commissioners — Dallas, Tex., Oct. 18-21. James B. Walker, 270 Madison Ave., New York.

Public Utilities Association of West Virginia—Parkersburg, W. Va., Oct. 26-27. A. Bliss McCrum, 514 Charleston National Bank Bldg., Charleston, W. Va.

NEW GENERATING STATION FOR IOWA FALLS. — A new power house, 50 ft. x 200 ft., in which a 3,500-kw. turbine will be installed, will be erected by the Central States Electric Company at its Iowa Falls (Iowa) plant, and a 99-year lease has been taken on ground which will be used for the additional unit. The new equipment will increase capacity of the plant four times and is expected to be in operation in nine months. The plant will be connected with Cedar Rapids, Marshalltown, Eldora and Boone.

NEW DAM FOR BALCH PLANT IN CALIFORNIA.—Construction work on a dam to be known as the Balch plant afterbay dam was started recently by the San Joaquin Light & Power Corporation, according to announcement from that company's offices in Fresno, Cal. The dam, which is to cost approximately $200,000, will confine waters that have passed through the recently completed Balch power house and will be used to regulate the flow of the Kings River so that power uses will not materially alter stream flow in the lower river. The dam will ultimately rise 75 ft. above the riverbed and will be about 65 ft. high at the outset. It will be 170 ft. long at its crest, of simple arch design with a constant radius, 24 ft. through at the base and 5 ft. through at the top. The dam, which will impound 100 acre-feet of water, has an unusual feature in that two needle-type control valves 24 in. in diameter will be used to regulate the flow of water from the afterbay. These valves will be electrically operated from the power house. It is planned to complete the dam in November.

POWER POSSIBILITIES IN TIDEWATER VIRGINIA. — As a part of a plan for speeding up the development of some of the tidewater counties of Virginia, Dr. F. H. Newell, formerly of the United States Reclamation Service and now head of the Research Service of Washington, has been engaged to study their resources and to make recommendations looking to their most effective use. Some of these counties have no electric service, and it is apparent that the extension of privately owned transmission lines into the region will be slow. Dr. Newell therefore expects to recommend that county bond issues be floated to build lines which then would be leased to the power companies. A part of the region which Dr. Newell now is studying would offer an outlet for power developed on the Potomac River, he points out. Lines from Great Falls could be interconnected with those of properly located steam plants. There are many points where peak power could be developed. If advantage is taken of these opportunities, Dr. Newell believes cheap power can be supplied over an extended area rich in mineral and other resources. His report is to be filed in November. As reported in a previous issue, stream gaging is being carried on under state auspices.

Recent Court Decisions

MUNICIPAL PLANT FORBIDDEN TO REFUSE SERVICE BECAUSE OF DISPUTE OVER LEASE.—An alternative writ of mandamus compelling the water and light department of Kansas City, Kan., to furnish water and electricity to the Kansas City Malleable & Steel Casting Company was granted by the Wyandotte County District Court on the company's showing that it could not operate unless the city furnished water and electricity and that it had placed a bond as security with the city. The city, it is understood, had refused to serve the company because of a disagreement over the lease on certain property which belongs to the city.

POWER COMPANY'S NEGLIGENCE IN NOT VENTILATING TUNNEL QUESTION FOR JURY. — Ledford vs. Tallahassee Power Company was a suit for damages because of injury from gassing caused to a boy, one of several workmen overcome in a tunnel being driven through a mountain by the company to connect the Cheoah River with the Tennessee River. The tunnel was alleged to have been unventilated. The trial court found for the plaintiff and has been sustained by the Supreme Court of North Carolina, which held that an employer must provide a safe place to work and that the question of failure to do so was for the jury. (138 S. E. 424.)*

UTILITY OCCUPYING FIELD HAS PRIOR RIGHT OVER WOULD-BE COMPETITOR. — In adjudicating a suit brought by the Bartonville Bus Line against the Eagle Motor Coach Line, the Supreme Court of Illinois declared that, "where additional or extended service is required in the interest of the public and a utility in the field makes known its willingness and ability to furnish the required service, the Commerce Commission is not justified in granting a certificate of convenience and necessity to a competing utility until the utility in the field has had an opportunity to demonstrate its ability to give the required service." (157 N. E. 175.)

LIMITATIONS ON COMMISSION'S POWERS.—In Idaho Power Company vs. Thompson, the United States District Court in Idaho emphasized the purely administrative nature of the functions of the Public Utilities Commission of the state, pointing out that it cannot initiate policies of its own or invade the field of managerial discretion. It is without authority to disapprove a rate intrinsically just and reasonable and substitute another which is, in a legal sense, unjust or unreasonable merely because it would be a wise policy so to do, or because a utility has so conducted itself as to be estopped from being entitled to a reasonable compensation. For these reasons the court overruled a discount of 33⅓ per cent from normal rates which the commission had prescribed in favor of hospitals, fraternal organizations, commercial clubs and benevolent, religious and eleemosynary institutions. While the Legislature might perhaps legally authorize such a discount, it had conferred no such authority on the commission. (19 Fed. (2d) 547.)

WHAT IS "REASONABLE TIME" TO DETECT AND REPAIR BROKEN WIRE MAY BE QUESTION EITHER OF LAW OR FACT.—Ozella Brown recovered damages in an Arkansas court against the Dierks Lumber & Coal Company, a supplier of electricity, on the ground that because of a broken wire she received a severe shock, with serious after-effect, while operating a motor-driven sewing machine. The United States Circuit Court of Appeals has reversed the decision and ordered judgment for the defendant, holding that evidence that the defect, if any, in the company's appliances existed less than an hour and that the alleged injuries were trivial refuted the inference of negligence arising from the fact of injury. While the question of what constitutes a "reasonable time" for a power company to discover and repair a broken wire before it would become liable for injuries from excessive voltage caused thereby is a jury question if the facts or reasonable inferences therefrom are disputed, otherwise, as in this case, it is a question of law. (19 Fed. (2d) 732.)

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

Commission Rulings

APPRAISING "GOING VALUE" FOR A THREE-DEPARTMENT UTILITY COMPANY.—The Missouri Public Service Commission, in fixing rates for the City Light & Traction Company of Sedalia, which operates electric gas and street-railway departments, was controlled by the circumstances surrounding each particular division. In the case of the electric department, the developments in the use of electricity gave promise of a greater extension of the service and a better load factor. For this reason the commission assigned to this department a higher "going concern" value than to the other two. The commission believed that the present level of gas rates was very close to the dividing line between the economical and the non-economical use of gas, and that the inducements, over and above the physical elements, to a prospective purchaser were decidedly less than in the case of the electric department. A smaller allowance was therefore made for going value, and no allowance at all was made in the case of the street-railway department because the operation had shown an actual deficit and the commission was firmly convinced that the railway department had reached the point of diminishing returns and that a prospective purchaser would find here no value greater than that of the physical items of property.

APARTMENT-HOUSE LIGHTING SUPPLIED THROUGH ONE METER CLASSIFIED AS COMMERCIAL SERVICE.—The Idaho Public Utilities Commission has held, after investigating a complaint from the Idaho Power Company about the classification of apartment-house lighting, that where such houses are served through one master meter and the energy furnished is paid for by the owner of the house, Schedule No. 1, applicable to residence and individual apartment lighting service, cannot be used and that, in the absence of any other pertinent schedule, Schedule No. 3, for commercial lighting service, applies.

COMMISSION OPPOSES READJUSTMENT OF CAPITAL ENTRIES.—The Wisconsin Railroad Commission found that book entries made by the Wisconsin Fuel & Light Company to reflect the value of fixed capital were in violation of the uniform system for classifying accounts, which directs that all charges to fixed capital shall show the actual cost of property acquired, and no more, and that there shall be no addition of arbitrary percentages to cover assumed overhead costs. The company maintained that in submitting a financial statement to bankers or others it is desirable to show the present value of property and also going value, but the commission held that present value and intangible elements of value not representing actual expenditures should not be included in book figures.

COMMISSION ORDERS YEAR'S TEST WHERE METER JUMPING IS ALLEGED.—An unusual ruling was handed down by the Missouri Public Service Commission recently when it ordered the Union Electric Light & Power Company of St. Louis to restore service at the home of Jacob Handelman, so that a test can be conducted over a twelve-month period to determine whether the company was justified in cutting off service because of an alleged jumper found in the meter. The service was interrupted last May, the company contending that the meter had been tampered with and refusing to restore service until Handelman should agree to pay what the company estimated was due for electrical energy probably used but not recorded by the meter. The company placed this amount at $400. Handelman appealed to the commission, denying that he had tampered with the meter, and proposing that a locked box be placed over the meter and a test made during the next year. He agreed to pay the cost of the installation. This was the substance of the commission's ruling.

News About Men of the Industry

C. P. Couch Resigns as General Manager

C. P. Couch has resigned as general manager of the Mississippi Power & Light Company, Jackson, Miss., to become vice-president and general manager of the Southern Ice & Utilities Company, operating ice, ice-cream, creamery and cold-storage plants in about forty cities and towns in Arkansas, Louisiana, Texas and Oklahoma. Mr. Couch will have headquarters at Dallas, Tex. He retains his interests in and remains as vice-president of the Mississippi Power & Light Company.

C. P. COUCH

Mr. Couch removed to Mississippi from Arkansas four years ago, when the Mississippi Power & Light Company was organized, with his brother, H. C. Couch, as president, to take over and operate utilities in Jackson, Vicksburg, Greenville and several other cities and towns. They launched a program of development that has provided Mississippi with the advantages of interconnected electric power service and extended the benefits of such service to about 90 cities and towns of the state.

A. B. EADIE, formerly superintendent of the Home Electric Company at Coudersport, Pa., has been transferred to St. Marys, Pa., to become superintendent of the Keystone Power Company.

CARL E. JOHNSON, vice-president of the U. S. Electrical Manufacturing Company and president of the U. S. Industries, Inc., of Los Angeles, has resigned and disposed of his entire holdings in both companies. Mr. Johnson has been an officer and director of both companies since their inception and has been intimately identified with the electrical manufacturing industry in southern California for more than twenty years.

E. D. KETCHAM has joined the Central Hudson Gas & Electric Corporation, Poughkeepsie, N. Y., in the capacity of safety engineer. Mr. Ketcham has had considerable experience in safety work. He received his training in electrical engineering at the Rensselaer Polytechnic Institute, and for two years after graduation he was identified with the experimental laboratory of the Scoville Manufacturing Company, Waterbury, Conn. Subsequently he spent four years with the Aetna Life Insurance Company as inspector and safety engineer in Hartford, New York, Buffalo and Albany.

F. L. Ball Made Vice-President of Tenney Company

F. L. Ball, an officer of several of the light and power companies under the management of Charles H. Tenney & Company, Boston, has been elected a vice-president of that holding company and vice-president of the Exeter & Hampton Electric Company. Mr. Ball's recent election marks the latest recognition of his long and valuable career with the Tenney interests, dating back to 1901. During that period of service, his work has included almost every branch of central-station operation and management, accounting, purchasing, production and sales. Mr. Ball made a special study of safety engineering and resuscitation with such exceptional results that he has been in charge of safety work in all Tenney companies for several years.

Mr. Ball entered the employ of Charles H. Tenney & Company as a boy in 1901. At the age of 26 he was appointed manager of the Haverhill (Mass.) Electric Company. Upon his return from military service he was assigned to the Fitchburg (Mass.) Gas & Electric Light Company in the capacity of manager and last year was promoted to a vice-presidency, in addition assuming similar executive duties with the Montpelier & Barre (Vt.) Light & Power Company. Mr. Ball has been active for many years in the Fitchburg Chamber of Commerce.

F. L. BALL

OBITUARY

LEWIS LILLIE, a vice-president of the United Gas Improvement Company, Philadelphia, died at his home in Haverford, Pa., Aug. 27, in his sixty-fourth year. Mr. Lillie had been a prominent figure in utility circles in the East for a number of years, having served on the directorate of the Public Service Corporation of New Jersey, the Connecticut Light & Power Company and the Counties Gas & Electric Company, in addition to holding an executive position with the United Gas Improvement Company since 1900. He became auditor of the United Gas Improvement Company in 1887. Six years later he was promoted to be assistant treasurer and one year later to be comptroller. It was in 1900 that he was elected secretary and treasurer. From 1905 to 1918 he performed the duties of vice-president, and in the latter year, still retaining his vice-presidency, he was elected general manager. In the spring of 1926 Mr. Lillie resigned as general manager on account of illness. Mr. Lillie was born Oct. 13, 1863, and was educated in the public schools at Troy. At the age of sixteen he began his business career in New York as a clerk in the legal department of the Northern Pacific Railroad. He did not confine his business interests to the public utility industry, for his name appeared on the directorate of the Guaranty Company of North America, the Franklin-Fourth Street National Bank, the Welsbach Company and various other local enterprises.

C. L. JOHNSON, an executive of the manufacturing department of the Western Electric Company, died in Pittsfield, Mass., Aug. 24, following an operation for appendicitis. A native of Chicago and a graduate of Cornell University, Mr. Johnson had been affiliated with the Western Electric Company since 1899 at Chicago, Montreal and in Europe, where he made special studies in the company's Continental factories, and more recently in New York.

JAMES K. MITCHELL, secretary-treasurer of the Galesburg (Ill.) Gas & Electric Company for 24 years prior to its absorption by the McKinley interests, died Aug. 22 in San Francisco, where he was stricken early in the month with paralysis.

CHRISTIAN MILLER, president of the Northeastern Iowa Power Company, Lyle, Minn., died Aug. 26 at Rapid City, S. D. Mr. Miller became interested in the light and power business at an early age, his purchase of an old mill marking the beginning of the Northeastern Iowa Power Company. He was 80 years of age.

Financial and Statistical News

Utility Markets Very Dull Heavy Financing Anticipated Johns-Manville a Feature

THE last week of August would probably qualify for a record in dullness on the utility markets. Very few price changes of any significance are recorded, and the averages changed little, if at all. Among the manufacturing stocks Johns-Manville was the feature, with its rapid rise to over 115, which is double the price set by the recent split-up. General Electric continues its upward trend, and further interest is shown in Westinghouse Electric & Manufacturing. Some of the preferred stocks, like Empire Gas & Electric 8 per cent preferred, moved upward, but the common issues of power and light companies have been unusually inactive during the week just ended.

According to opinion in investment banking circles, the fall program of power and light financing will be a heavy one. As now indicated, the year's total will far exceed that of 1926. Up to Aug. 1 total public financing amounted to more than $876,000,000 and rights offered to shareholders add some $80,000,000. Power and light company financing in sight will reach a total of at least $250,000,000. This in itself would bring the aggregate up to last year's total. Companies which have indicated their intention to finance in a large way include Southern California Edison, Pacific Gas & Electric, New York Power & Light Corporation and Cities Service. Much of this financing, incidentally, is in the interests of improving financial set-ups and reducing interest charges.

Half-Year Central-Station Business Shows Good Gain Over 1926

Revenue up 10.5 per Cent—Energy Gained 11.3 per Cent—Average Daily Revenue, $4,660,000—Water Furnishes Nearly 2,500,000,000 Kw.-Hr. in June

ALTHOUGH the first half of 1926 was generally regarded as a period of high activities in business, as indicated in the electric light and power industries by notable gains both in energy output and in revenue, it was exceeded in the corresponding period of 1927 by 11.3 per cent as to energy generated and 10.5 per cent as to revenue.

Compared with 1926, the energy output rose each month until May, which was 13.6 per cent above May, 1926. There was a moderate recession in June, though with an output 10.5 per cent above June, 1926. The average daily output in June was 203,300,000 kw.-hr., and the estimated normal, based on growth during the preceding five years,

TABLE I—GENERATION AND DISTRIBUTION OF CENTRAL-STATION ENERGY IN THE UNITED STATES
(100 Per Cent of the Industry)

Month	Kw.-Hr. Generated Monthly *			Estimated Distribution of Energy Generated										Energy Purchased by Public Utilities for Resale, Kw.-Hr.	
				Total Energy Consumption by Central-Station Customers, Kw.-Hr.		Energy Consumed for Lighting, Kw.-Hr.		Energy Consumed for Power, Kw.-Hr.		Energy Sold to Electric Railways, Kw.-Hr.		Energy Used in Intracompany Business, Including Line Losses, Kw.-Hr.			
	1927 Thousands	1926 Thousands	Per Cent Inc.	1927 Thousands	1926 Thousands	1927 Thousands	1926 Thousands	1927 Thousands	1926 Thousands	1927 Thousands	1926 Thousands	1927 Thousands	1926 Thousands	1927 Thousands	1926 Thousands
Jan....	6,303,199	5,683,055	+10.9	5,183,199	4,586,055	1,395,000	1,260,000	3,165,199	2,712,055	623,000	614,000	1,120,000	1,097,000	1,209,000	965,000
Feb....	5,706,468	5,190,645	+ 9.9	4,696,468	4,188,645	1,210,000	1,128,000	2,928,468	2,510,645	558,000	550,000	1,010,000	1,002,000	1,137,000	920,000
Mar....	6,314,272	5,727,028	+10.3	5,194,272	4,621,028	1,305,000	1,212,000	3,304,272	2,832,028	585,000	577,000	1,120,000	1,106,000	1,212,000	1,030,000
April..	6,049,656	5,389,573	+12.3	4,979,656	4,349,573	1,235,000	1,152,000	3,194,656	2,655,573	550,000	542,000	1,070,000	1,040,000	1,189,000	1,007,000
May..	6,175,840	5,436,704	+13.6	5,080,840	4,386,704	1,252,000	1,164,000	3,286,840	2,688,704	542,000	534,000	1,095,000	1,050,000	1,252,000	1,009,000
June..	6,098,826	5,509,356	+10.5	5,018,826	4,446,365	1,205,000	1,150,000	3,285,826	2,774,356	528,000	522,000	1,080,000	1,063,000	1,242,000	1,059,000
Total 6 mo..	36,648,261	32,936,361	+11.3	30,153,261	26,578,361	7,602,000	7,066,000	19,165,261	16,173,361	3,386,000	3,339,000	6,495,000	6,358,000	7,241,000	5,990,000

*Data on "energy generated" are those collected and published by the United States Geological Survey for all public utilities minus such data as are collected on nergy generated by electric railway companies, reclamation service and manufacturing plants. The data are, therefore, for the electric light and power industry only.

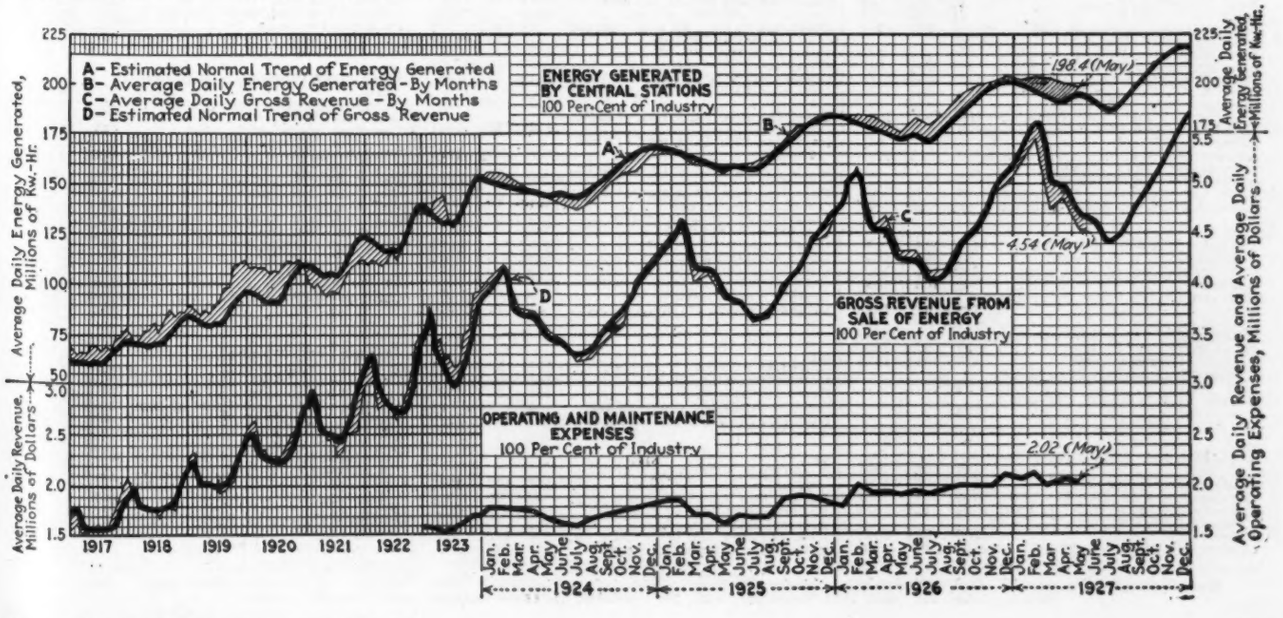

A– Estimated Normal Trend of Energy Generated
B– Average Daily Energy Generated – By Months
C– Average Daily Gross Revenue – By Months
D– Estimated Normal Trend of Gross Revenue
ENERGY GENERATED BY CENTRAL STATIONS
100 Per Cent of Industry
GROSS REVENUE FROM SALE OF ENERGY
100 Per Cent of Industry
OPERATING AND MAINTENANCE EXPENSES
100 Per Cent of Industry
198.4 (May)
45.4 (May)
2.02 (May)
Average Daily Energy Generated, Millions of Kw.-Hr.
Average Daily Revenue, Millions of Dollars
Average Daily Energy Generated, Millions of Kw.-Hr.
Average Daily Revenue and Average Daily Operating Expenses, Millions of Dollars
1917 1918 1919 1920 1921 1922 1923
1924 1925 1926 1927

TABLE II—CENTRAL-STATION FINANCIAL OPERATIONS FOR FOUR MONTHS IN THE UNITED STATES
(100 Per Cent of the Industry)

Month	Total Gross Revenue from Sale of Energy†			Estimated Distribution of Gross Revenue								Total Operating and Maintenance Expenses‡	
				Lighting Customers		Power Customers		Electric Railways		Other Public Utilities			
	1927 Thousands	1926 Thousands	Per Cent Inc.	1927 Thousands	1926 Thousands	1927 Thousands	1926 Thousands	1927 Thousands	1926 Thousands	1927 Thousands	1926 Thousands	1927 Thousands	1926 Thousands
January.	$162,000	$145,100	+11.6	$102,000	$92,300	$43,200	$38,400	$5,800	$5,300	$11,000	$9,100	$63,900	$58,300
February	152,300	138,500	+10.0	94,100	86,200	42,100	38,300	5,400	4,800	10,700	9,200	61,300	55,730
March...	146,200	133,600	+ 9.4	88,100	82,500	41,900	36,900	5,300	4,750	10,900	9,450	63,000	57,900
April....	145,700	132,500	+10.0	86,700	80,600	43,400	37,400	5,100	4,830	10,500	9,670	62,110	56,860
May....	140,600	126,900	+10.8	83,100	77,900	42,300	35,400	4,800	4,700	10,400	8,900	62,280	57,530
June....	140,000	126,800	+10.6	82,200	77,900	42,400	35,400	4,700	4,600	10,700	8,900	62,400	58,800
Total for six mo.	$886,800	$803,400	+10.5	$536,200	$497,400	$255,300	$221,800	$31,100	$28,980	$64,200	$55,220	$374,990	$345,120

†Aggregate gross revenue from actual consumers, and sales to other public utilities for resale, involving a certain amount of duplication.
‡Do not include interest, taxes, depreciation or sinking fund.

was 190,500,000 kw.-hr. The month's output, therefore, was materially higher than might have been predicted from past experience.

The increase in revenue was at a slightly higher rate than the increase in energy output. This was to be expected in view of the high energy output in May.

The output of water-power plants continues to be of increasing importance. They provided 41 per cent of the total output in growth. They carried an even half of the increase over the energy output of June, 1926. The 9 per cent increase in energy generated from fuel as compared with June, 1926, was brought about by an increase of 3.1 per cent in coal and 23.2 per cent in natural gas and a decrease of 23.8 per cent in fuel-oil consumption. The latter has been constantly decreasing and is now lower than for any previous month covered by the records of the United States Geological Survey.

Compared with 1926, the Southern States report the greatest activity. In the group as a whole, from the Atlantic

TABLE III—OPERATING RATIO OF CENTRAL-STATION COMPANIES

	Operating Ratio					
	Steam Plants		Hydro Plants		Combined Hydro and Steam Plants	
	1927	1926	1927	1926	1927	1926
Jan.	40.6	40.6	33.3	31.8	39.2	40.4
Feb.	42.7	42.2	37.4	36.5	39.6	40.8
Mar.	45.2	44.9	37.9	36.1	42.4	44.2
April	44.8	44.7	37.4	35.8	39.5	39.9
May	47.9	48.4	40.3	38.2	42.2	43.4
June	48.9	49.9	41.9	38.0	42.5	45.0

Stock Quotations of Electric Light and Power and Manufacturing Companies

(Prices on New York stock market unless otherwise noted. Unless otherwise noted the par, stated, or preference value of stock is $100.)

Companies	Bid Price Tuesday Aug. 30	Low 1927	High 1927
ABITIBI PWR. & PAPER, 4% com.—no par	107½	83	109
Adirondack Pwr. & Lt.—7% pf.	112½	107	113½
Adirondack Pwr. & Lt.—8% pf.	115	112	116
Ala. Pwr., $7 cum. pf.—no par	112	107	112½
Allis-Chalmers Mfg., 7% pf.	m111½	109	112½
Allis-Chalmers Mfg., 6% com.	110	88	111½
Aluminum Co. of Amer., com.	99½	67½	105
Aluminum Co. of Amer., 6% pf.	103	101½	104½
Amer. & Foreign Pwr., pf. 25% pd.	m110	....	....
Amer. & Foreign Pwr., 7% pf.—no par	105	86½	105½
Amer. & Foreign Pwr., com.—no par	24½	18½	25½
Amer. Bosch Magneto, com.—no par	23½	13	23½
Amer. Brown Boveri Elec†	7½	5½	39½
Amer. Brown Boveri Elec., pf. $7	42	40	95
Amer. Gas & Elec., 6% pf.—no par	103	95½	105½
Amer. Gas & Elec., com.†—no par	105	68½	107½
Amer. Lt. & Trac., 6% pf.	115	112	120
Amer. Lt. & Trac., new com.	170	164½	178½
Amer. Pwr. & Lt., 6% pf.	k103½	97½	105
Amer. Pwr. & Lt., com.†—no par	66½	54	67½
Amer. Pub. Serv., 7% pf.	a100½	94	104
Amer. Pub. Serv., com.†	65	....	....
Amer. Pub. Utilities, 7% pfc. pf.	k 86½	73	88
Amer. Pub. Utilities, 7% pr. pf.	a 93½	92	96
Amer. Pub. Utilities, com.	k 55	65	70
Amer. States Sec., A	4½	2½	4½
Amer. States Sec., B	4½	2½	4½
Amer. Superpwr., 6% pfc. pf.—25	m 29½	26½	29½
Amer. Superpwr., 6% 1st pf.	d 98	....	....
Amer. Superpwr., Class A†—no par	35	27½	38½
Amer. Superpwr., Class B†—no par	36½	28½	39½
Amer. Wtr. Wks. & Elec., 7% pf.	m111½	104½	111½
Amer. W. W. & E., com. $1.60—20.	105	62½	105½
Anaconda Copper cap. $3	47	41½	49½
AppalachianElectric Pwr., 7% pf.	104	100	105
Appalachian Elec. Pwr., com.	m 78	77	83
Arizona Pwr., 7% pf.	k 71	77	84½
Arizona Pwr., com.	m 20	....	....
Arkansas Pwr., & Lt. 7% pf.	103½	....	....
Assoc. Gas & Elec., $3.50—50	51½	....	....
Assoc. Gas & Elec., pf.—$6—no par.	93	85	93
Assoc. G. & E., Class A, 10—no par.	41½	35	43
BABCOCK & WILCOX, 7% com.	114	115	123
Binghamton L., H. & P., $6 pf.	98	93	100
Birmingham Elec., pf.—$7—no par.	107½	105	109
Blackstone Valley G. & E., 6% pf.	106	103	105
Blackstone Valley Gas & Elec., 10% com.—50	k139	98	153
Blaw-K nox, com.†	m 75	70	75
Brasilian Trac., Lt. & pwr., com.†	f184½	....	....
Broad River Pwr., 7% pf.	101	97	103
Brooklyn Edison, 8% com.	179½	148½	184½
Buffalo, Niagara & East. Pwr., $1.60 pf.—25	k 26	....	....
Buffalo, Niagara & East. Pwr. com. $1—no par	k 35	....	....
CALIFORNIA ELEC. GENERATING, 6% pf.	97	96	99½
California Ry. & Pwr., 7% pf.	135a	125	150
Carolina Pwr. & Lt., pf.—$7—no par	k109½	107	109
Central & S.W. Util., $7 pf.—no par	a 96½	93½	97½
Central & S.W. Util., pr.in.$7 pf.—no par	a103	98½	104½
Central Ariz. Lt. & Pwr., 8% pf.	k 97	95	98
Central Ark. Ry. & Lt., 7% pf.	106	100	104
Central Ill. Pub. Serv., $6 pf.	a93	88½	95½
Central Ind. Pwr., 7% pf.	94	86	96
Central Pwr. & Lt., 7% pf.	101	100½	103
Central States Elec., 7% pf.	97	93	97
Central States Elec., com.†	m200	....	....
Century Elec., 6% com.	m115	115	115
Chicago Fuse Mfg., com.—$2.50 no par	a 34½	30	35
Cincinnati Gas & Elec., 5% com.	a 99½	96½	100
Cities Service, $6 pf—no par	j 90	87½	90½
Cities Service, pf. B—no par	j 8	7½	8½
Cities Service, pf. BB—no par	j 82	81	85½
Cities Service, com.—20	j 48½	40½	58½
Cities Service, Bks. Shrs.—10	j 24	22½	29½
Clarion River Pwr., 8% pf.	95	....	....
Cleveland Elec. Illg., 6% pf.	110½	108	112
Cleveland Elec. Illg., 10% com.	320	285	330
Columbia Gas & Elec., 6% pf.	106	99½	107½
Columbia G. & E. com. $5—no par.	94½	82½	98
Columbia Ry., Gas & Elec., 6% pf.	m 98	97	100
Columbus Elec. & Pwr., $2 com.—no par	70	....	....
Columbus Ry., Pwr. & Lt., 6%, 1st pf.	103	98½	102½
Columbus Ry., Pwr. & Lt., 6½% pf. B	101½	96	103½
Columbus Ry., P. & L., com.—no par	100	75	105
Commonwealth Edison, 8% com.	a152½	138	155
Commonwealth Pwr., 6% pf.	100½	91½	100½
Commonw'th Pwr., $2, com.—no par	58½	48½	59½
Conn. Lt. & Pwr., 8% pf.	121	119	123
Conn. Lt. & Pwr., 7% pf.	117	112	118
Cons. Gas of N. Y., pf.	99½	93	99½
Cons. Gas of N. Y., com $5—no par.	111½	94	114½
Cons. Gas, Elec. Lt. & Pwr. of Balti., 6% pf.	e110	106½	110
Cons. Gas, Elec. Lt. & Pwr. of Balti., 6½% pf.	e113½	110½	114½
Cons. Gas, Elec. Lt. & Pwr. of Balti., 7% pf.	e117	112½	117
Cons. Gas, Elec. Lt. & Pwr. of Balti., 8% pf.	e130½	127	130½
Cons. Gas, Elec. Lt. & Pwr. of Balti., com. $2.50—no par.	e 61½	51	62
Consolidated Pwr. & Lt., 7% pf.	105	100	106
Consumers Pwr., 6% pf.	103½	100	102
Consumers Pwr., 6.6% pf.	105½	103	105½
Continental Gas & Elec., 8% pfc. pf.	108½	103	106½
Continental Gas & Elec., 7% pr. pf.	103	100	103
Conti. G. & E. com. $4.40—no par.	200	210	225
Crocker Wheeler, com.†	25	30	38
Crocker Wheeler, 7% pf.	82	78	88
DALLAS PWR. & LT., 7% pf.	109½	107	110½
Dayton Pwr. & Lt., 6% pf.	k106	101	107
Detroit Edison, 8% com.	152	133½	157
Dubilier Condenser, com.—no par.	3	2½	5½
Duquesne Lt., 7% pf.	k115	114½	116½
EASTERN NEW YORK UTIL.: $7 pf.	107	102	104½
Eastern New York Util. com.	65	70	75
Eastern States Pwr., $7, com.	9	9	13
Eastern States Pwr., pf.	90	90	95
East. Tex. Elec., 7% pf.	106	106	108
Edison Elec. of Boston, $12 com.	d243	217	267
El Paso Elec., 7% pf.	108	105	107½
Elec. Bond & Share, 6% pf.	f109	105½	109½
Elec. Bd. & Sh. Sec., com. $1—no par	f 75	67½	79½
Electric Household Util.†	a 15	11	15½
Elec. Investors, 6% pf.—no par.	96	92	96
Elec. Investors, com.†—no par.	38½	32½	40½
Elec. Investors, 10% pd. receipts	m 15	....	....
Elec. Pwr. & Lt., ctfs. pf.	105	96	106½
Elec. Pwr. & Lt., ctfs., 40% pd.	k115½	103½	115
Elec. Pwr. & Lt., ctfs, full pd.	m114	108½	111½
Elec. Pwr. & Lt., ctfs., com.—no par.	25½	16½	26½
Elec. Refrig. cap.†	13½	12½	37½
Elec. Ry. Securities, com.—no par.	6½	....	....
Elec. St. Battery com. $5.25—no par	69½	63½	79½
Elmira Wtr., Lt. & R.R., 7% pf.	103	99	101½
Emerson Elec., pf.	m109	107½	111
Empire Pwr., pfc.†	35½	26	39
Engr. Pub. Serv., $7 pf.—no par.	m104½	93½	106½
Engr. Pub. Serv., com.—no par	32½	21½	33½
Eureka Vacuum Cleaner, com. $4—no par	69½	50	77
FAIRBANKS MORSE, 7% pf.	k108	107½	112
F.-M., com.—$3—no par.	k 38½	37½	43½
Federal Lt. & Trac., com. $1.40	42½	37½	47
Federal Lt. & Trac., $6 pf.—no par.	98	91½	100
Ft. Worth Pwr. & Lt., 7% pf.	f111	108	112
GALVESTON-HOUSTON ELEC. 6% pf.	70	68	72
Galveston-Houston Elec., com.	28	22	31
Gen. Elec., $3 com.—no par.	140½	81	140½
Gen. Elec., special—6%	11½	11	11½
Gen. Gas & Elec. (Del.) com. A, $1.50—no par	42½	34	47½
Gen. G. & E. (Del.) com. B—no par.	m 45	35½	44½
Gen. G. & E. (Del.) pf. A, $8—no par.	k116	113½	120
Gen. G. & E. (Del.) pf. A $7—no par.	109	100	109½
Gen G. & E. (Del.) pf. B $7	k103	96	105
Gen. Pub. Serv., $7 cum. pf., no par.	k107	102	106
Gen. Pub. Serv., com., no par.	13½	11½	15½
Ga. Lt., Pwr. & Rys., 6% pf.	92	87	96
Ga. Lt., Pwr., & Rys., com.	m 50	50	80
Ga. Ry. & Pwr., 8% pf.	k123	119	125
Ga. Ry. & Pwr., 7% pf.	k113½	106	110
Gt. Western Pwr., 7% pf.	k103	....	....
IDAHO PWR., 7% pf.	106	103	109
Ill. No. Utilities, 6% pf.	k 88	88	92
Ill. Pwr. & Lt., 7% pf.	102	99	101½
Ingersoll Rand com. $8	91	88½	96½
Int. Combus. Engr., com. $2—no par	50½	43½	64
Int. Util., Class A—$3.50—no par.	41½	28	41½
Int. Utilities, Class B—no par.	5½	3	7½
Interstate Pwr., pf.—$7—no par.	95½	93	98
Interstate Pub. Serv., 7% pf.	100	98	99½
Iowa Ry. & Lt., 7% pf.	98	97	99
JERSEY CENTRAL PWR. & LT. CO., 7% pf.	102	97½	103
Johns-Manville, com.†—no par.	114	55½	120½

Stock Exchange: aChicago; bSt. Louis; ePhiladelphia; dBoston; eBaltimore; fMontreal; gCincinnati; hSan Francisco; iPittsburgh; jWashington. kBid price Saturday, Aug. 27. fBid price Wednesday, Aug. 31. mLatest quotations available. †Dividend rate variable.

TABLE IV—OPERATIONS OF CENTRAL-STATION HYDRO AND FUEL PLANTS IN THE UNITED STATES*
(100 Per Cent of the Industry)

Month	Energy Generated: Hydro-Plants 1927 Thousands of Kw.-Hr.	Hydro-Plants 1926 Thousands of Kw.-Hr.	Hydro-Plants Per Cent Increase	Fuel Power Plants 1927 Thousands of Kw.-Hr.	Fuel Power Plants 1926 Thousands of Kw.-Hr.	Fuel Power Plants Per Cent Increase	Fuel Consumption: Coal 1927 Short Tons	Coal 1926 Short Tons	Coal Per Cent Increase	Oil 1927 Barrels	Oil 1926 Barrels	Oil Per Cent Increase	Gas 1927 Thousands of Cubic Feet	Gas 1926 Thousands of Cubic Feet	Gas Per Cent Increase
January	2,331,140	1,928,775	+20.9	3,972,059	3,754,280	+ 5.8	3,365,461	3,272,761	+2.8	786,062	972,131	—19.1	3,900,868	3,661,363	+ 6.5
February	2,172,740	1,886,471	+15.2	3,533,728	3,304,174	+ 6.9	2,958,797	2,886,534	+2.5	646,558	683,580	— 5.4	3,859,791	3,328,365	+15.9
March	2,551,792	2,237,457	+14.1	3,762,480	3,489,571	+ 7.8	3,090,984	3,071,092	+0.6	612,657	670,248	— 8.6	4,312,322	3,899,085	+10.6
April	2,526,938	2,279,976	+10.8	3,522,718	3,109,597	+13.3	2,942,421	2,742,058	+7.3	524,148	600,368	—12.7	4,482,900	3,465,746	+29.2
May	2,596,538	2,266,305	+14.6	3,579,302	3,170,399	+12.9	2,912,618	2,720,082	+7.0	461,452	569,125	—18.8	4,821,947	3,712,226	+29.8
June	2,486,128	2,191,225	+13.4	3,612,698	3,318,131	+ 8.9	2,895,666	2,807,988	+3.1	449,564	589,567	—23.8	5,163,058	4,190,576	+23.2
Total for six mo.	14,665,276	12,790,209	+14.6	21,982,985	20,146,152	+ 9.1	18,165,947	17,500,515	+3.8	3,480,441	4,085,019	—14.8	26,540,886	22,257,361	+19.3

*As collected by United States Geological Survey. The data are for the electric light and power industry only.

seaboard as far west as Oklahoma and including the southern portion of the Rocky Mountain division, the gain for June averaged about 20 per cent. Progress in the Northeastern section has been normal. It was subnormal along the Pacific Coast with the exception of Washington, where there was nearly a 20 per cent increase. The smallest gains were in the West and North Central States and in the northern part of the Rocky Mountain division.

Bank Employees Buy Stock in Utility Company

As a tribute to Harvey C. Couch, president of the Arkansas, Louisiana and Mississippi Power & Light compa-

Stock Quotations of Electric Light and Power and Manufacturing Companies (Continued)

(Prices on New York stock market unless otherwise noted. Unless otherwise noted the par, stated, or preference value of stock is $100.)

Companies	Bid Price Tuesday Aug. 30	Low 1927	High 1927
KANSAS CITY PWR. & LT. pf. $7	*k*114	112	120¼
Kansas Gas & Elec., 7% pf.	*l*104½	103	107
Kentucky Hydro-Elec., 7% pf.	*a*100	94½	99
Kentucky Sec., 6% pf.	86	83	87
Kentucky Sec., 5% com.	109	110	115
Kentucky Utilities, 6% pf.	99½	95	98½
Keystone Pwr. & Lt., pf.	*m* 98	95	100
LACLEDE GAS LT., 12% com.	*k* 230	173½	267½
Lehigh Pwr. Sec., com.—no par.	19½	18	20
Long Island Ltg., 7% pf.	109½	107½	112
Long Island Ltg., com.†—no par.	150	139	153
Los Angeles Gas & Elec., 6% pf.	*k*102	98	104½
Louisville Gas & Elec., cl. A. $1.75	*k* 27½	23½	27½
MAN. ELEC. SUPPLY, cap. $5 —no par	52	50	132
Manila Elec., com.†—no par.	*k* 47	40	50
Maytag Mfg., com. .50—no par.	31½	23½	34½
Memphis P. & L., pf.—$7—no par	109	107	109
Metropolitan Ed., pf.—$6—no par.	100	93	100
Metropolitan Ed., pf.—$7—no par.	108	104	108
Metropolitan Ed., com. $5—no par.	70	60	72
Middle West Utilities, 6% pf.	*a* 93½	92½	93½
Middle West Util., 8% pr. lien	*a*122½	117½	122½
Middle West Util., com. $6—no par ex. div.	*a*111	108	117½
Midland Utilities, pr. in. 7% pf.	*a*105½	92½	106
Midland Utilities, 6% pf. A.	*a*102½	....	....
Milwaukee Elec. Ry. & Lt., 7% pf.	*k*102	100	103
Milwaukee Elec. Ry. & Lt., 6% pf.	*k* 98½	98	101½
Minn. Pwr. & Lt., 7% pf.	*l*106½	104	107
Miss. Pwr. & Lt., $8 pf.	*m*101	106	103
Miss. River Pwr., 6% pf.	102	94	103
Miss. River Pwr. 3% com.	62	....	....
Mohawk Hudson Pwr., 1st pf.—$7 —no par.	105	100	109
Mohawk Hudson Pwr., 2d pf.—$7 —no par.	104	98	112
Mohawk Hudson Pwr., com.—no par	31½	20½	32½
Montana Pwr., 7% pf.	*m*106½	118½	106½
Montana Pwr., 5% com.	101	81½	106½
Montreal Pwr., 7% com.	*f* 91½	....	....
Mountain States Pwr., 7% pf.	100	97	101
Mountain States pwr., com.†.	18	....	....
NASSAU & SUFFOLK LTG., 7% pf.	107	98	105
National Carbon, 8% pf.	*m*139½	130½	139½
National Elec. Pwr., A†	*a* 24½	23½	25½
National Lt., Ht. & Pwr., com.	24	....	....
National, Light, Ht. & Pwr., 5% pf.	70	....	....
National Pwr. & Lt., pf.—$7—no par	107½	101	108½
National Pwr. & Lt., com.†—no par.	22½	19½	23½
National Pub. Serv., 7% pf.	97	93	100
National Pub. Serv., 7% ptc., pf.	113	108	115
National Pub. Serv., A com. $1.60—no par.	22½	18½	24
National Pub. Serv., B com.—no par	*k* 18½	14	20½
Nebraska Pwr., 7% pf.	*l*109½	106	109
Nevada-Calif. Elec., com.	27½	24½	31
New Brunswick Pwr., 4% pf.	60	....	....
New Eng. Pub. Serv., pr. in. pf. $7.	102	98½	101
New Eng. Pub. Serv., pf. $7.	97	95	97½
New Orleans Pub. Serv.—7% pf.	104	103	105½
N. Y. & Queens Elec. Lt. & Pwr., 5% pf.	90	91	97
N. Y. Central Elec., 7% pf.	102	101	104½
Newport News & Hampton Ry., Gas & Elec., 5% com.	109	....	....
Newport News & Hampton Ry., Gas & Elec., 7% pf.	109	....	....
Niagara Falls Pwr., 7% pf.—25.	28½	27½	29½
Niagara, Lock. & Ont. Pwr., 7% pf.	111	110½	113
No. Amer., 6% pf.—50.	52½	50	55
No. Amer., com.—10	53½	45½	53½
No. Amer. Edison, $6 pf.—no par.	*k*101	96½	102½
No. Caro. Pub. Serv., pf.—$7—no par	100½	93	102½
Northeastern Pwr., com.	19	14½	20½
No. N. Y. Utilities, 7% pf.	105½	103	109
No. Ohio Pwr., com.—no par.	14½	9½	15½
No. Ohio Trac. & Lt., 6% pf.	83	78	81
No. Ohio Pwr. & Lt., 7% pf.	94	90	93
No. Ont. Lt. & Pwr., 6% pf.	*k* 91	84	95
No. Ont. Lt. & Pwr., 4% com.	72	73	78
No. States Pwr., (Del.) 7% pf.	106½	100½	107
No. States Pwr., (Del.) 8% com.	122	109½	124
No. Texas Elec., 6% pf.	62	65	70
No. Texas Elec., com.	22	27	36
OHIO BRASS, com. B $4—no par.	83	76	84
Ohio Brass, 6% pf.	105	100	105
Ohio Pwr., 6% pf.	100	96	103
Ohio Pub. Serv., $6 pf.	98	95	96½
Ohio Pub. Serv., 7% pf.	105	103	109
Ohio River Edison, 7% pf.	108½	103	109½
Oklahoma Gas & Elec., 7% pf.	101½	...	....
PACIFIC GAS & ELEC., 6% pf.	26½	24½	26½
Pacific Gas & Elec., 8% new com.	39½	31	40½
Pacific Pwr. & Lt., 7% pf.	*l*104½	102	104
Penn Cent. Lt. & Pwr., $5 pf.—no par	*c* 76½	75½	77½
Penn-Ohio Edison, 7% pf.	102½	97½	104½
Penn-Ohio Elec., 7% pf.	*m*101½	98	100
Penn-Ohio Pwr. & Lt., 7% pf.	106½	99	103
Penn Pwr. & Lt.—$7—no par.	*l*109½	107	109
Penn Wtr. & Pwr., 8% com., new.	*e* 58½	47½	58½
Phila. Co., 6% pf.—50.	*c* 52½	49½	52½
Phila. Co., com.—50.	*k* 106	85½	110
Phila. Elec., 8% com.—25.	*c* 52	46½	54
Portland Elec. Pwr., 7% pf.	99	97½	101
Portland Elec. Pwr., 6% pf.	79	78	83
Portland Elec. Pwr., 6% 2d pf.	58	55	70
Portland Elec. Pwr., com.	28	22	30
Potomac Elec. Pwr., 6% pf.	*m*108½	....	....
Pwr. Corp. of N. Y., com. $1—no par	*m* 79	....	....
Pwr. Sec., pf.—no par.	*k* 29	28	33
Pwr. Sec., com.—no par.	*k* 6	5	8
Public Serv. of Colorado, 7% pf.	*l*102	....	....
Pub. Serv. of N. J., 6% pf.	101	98½	101½
Pub. Serv. of N. J., 8% pf.	132	125	132
P. S. of N. J., $2 com.—no par.	42	32	45½
Pub. Serv. of No. Ill., 6% pf.	*a*106	101½	106
Pub. Serv. of No. Ill., 7% pf.	*a*117	112½	117
P. S. of No. Ill., com. $8—no par.	*a*142	130½	143
Pub. Serv. of No. Ill., $8 com.	*a*140½	132	142
Pub. Serv. of Okla., 7% pr. ln.	100	99	100½
Pub. Serv. Elec. & Gas, 6% pf.	108	102	108½
Puget Sound Pwr. & Lt., 7% pr. pf.	106½	105	107
Puget Sound Pwr. & Lt., $6 pf.—no par.	88	....	....
Puget Sound Pwr. & Lt., com.	32½	29½	36
RADIO CORP. OF AMER., $3.50 pf.—50	54	49	54½
Radio Corp. of Amer., com.—no par.	64½	41½	68½
Republic Ry. & Lt., pf.	*m*120	....	....
Republic Ry. & Lt., com.	*m*135	112	135
Rochester Gas & Elec. 6% pf. D.	104	103½	104½
Rochester Gas & Elec., 7% pf. B.	103½	105	107
Rochester Gas & Elec., 6% pf. C.	104½	101½	103½
SAFETY CABLE, com. $4.	65½	52½	74½
San Joaquin Lt. & Pwr., 7% pr. pf.	106	105	108
St. Joseph Ry., L., H. & P., 6% pf.	72	70	73
Servel Corp.	1½	1	10½
Sierra Pacific Elec., 2% com.	26½	24½	28½
Sioux City Gas & Elec., 7% pf.	102	99	104
Southeastern Pwr. & Lt., pf.—$7 no par	*l*108	....	....
Southeastern Pwr. & Lt. pfc. pf.	*l* 81½	....	....
Southeastern Pwr. & Lt., com.—no par	37½	29½	38½
So. Calif. Edison, 8% pf.	*k* 39	36½	40
So. Calif. Edison, 7% pf.	*k* 28½	27½	28½
So. Calif. Edison, 6% pf.	*k* 26	24½	27
So. Calif. Edison, 8% com.	36½	31½	37½
Southern Cities Utilities, 7% pf.	70	70	91
Southern Cities Utilities, com. $4.	*m* 31½	23½	42½
Southwestern Lt. & Pwr., A $3.	63	60	65
Southwestern Lt. & Pwr., B.	63	60	65
Southwestern Lt. & Pwr., $6 pf.	89	83	91½
Southwestern Pwr. & Lt., 7% pf.	*k*108	103	110½
Springfield (Mo.) Ry. & Lt., 7% pf.	102	95	102
Standard Gas & Elec., 8% pf.	64½	57½	64½
Standard Gas & Elec., 7% pr. pf.	107	103	110
Standard G. & E., com. $3.50—no par.	63½	54	65½
Standard Pwr. & Lt., 7% pf.	100	98	102½
Staten Island Edison, pf.—$6—no par.	100	99	101
Superheater, $6 com.—no par.	170	170	185
Syracuse Lighting, 7% pf.	105	103	107
Syracuse Lighting, 8% pf.	115½	....	....
Syracuse Lighting, 8% com.—no par	*m*300	....	....
TAMPA ELEC., com. $2.	58	....	....
Tenn. Elec. Pwr., 6% pf.	98	92	99
Tenn. Elec. Pwr., 7% pf.	107½	103	109
Terre Haute, Ind. & East. Trac., 5% pf.	26	20	30
Terre Haute, Ind. & East. Trac., com	1	1	3
Tex. Pwr. & Lt., 7% pf.	*l*110	106	110½
Tide Water Pwr., 8% pf.	109	105	110
Timken Roller Bear., com.—$4 no par.	128½	78	142½
Toledo Edison, 8% pf.	115	115	118
Toledo Edison, 7% pf.	*l*106½	....	....
Toledo Edison, 6% pf.	98	95	97
Toledo Edison, 6% com.	98	....	....
Tri-City Ry. & Lt., 6% pf.	97	90	97
UNITED GAS & ELEC., 6% pf.	101	98	102
United Gas & Elec., com.—no par.	*m* 57	....	....
United Gas & Elec. (N. J.) 5% pf.	72	70	73
United Gas Impr., 8% com.—50.	*c*112½	89½	114½
United Lt. & Pwr., pf.—$4—no par.	54	49	55
United Lt. & Pwr., pf.—$6.50—no par.	96	87	97½
United L. & P., com. A .48—no par.	*k* 13½	12½	15½
United L. & P., com. B .48—no par.	*a* 18	15	24
Utah Pwr. & Lt., 7% pf.	*l* 107½	104	108½
Utica Gas & Elec., 7% pf.	105	105	106½
Utica Gas & Elec., 8% com.	200	....	....
Utilities Pwr. & Lt., 7% pf.	95	93	100
Utilities Pwr. & Lt., com. A $2.	31½	27	34
Utilities Pwr. & Lt., com. B $1—no par.	18½	13½	19
VERMONT HYDRO-ELEC., 7% pf.	98½	95	100
Virginia Elec. & Pwr., 7% pf.	108	105	110
Virginian Pwr., 7% pf.	108	....	....
Virginian Pwr., com.	75	....	....
WAGNER ELEC., 7% pf.	*b* 87½	68	90
Wagner Elec., com.—no par.	*b* 31	18½	39½
Washington Ry. & Elec., 5% com.	250	180	275
Washington Ry. & Elec., 5% pf.	91½	....	....
Washington Wtr. Pwr., 8% com.	164	136	168
West Penn Elec., 7% pf.	110½	102	112
West Penn Elec., Cl. A $7.	*k*108	97½	111
West Penn Pwr., 7% pf.	114½	111	118
West Penn Pwr., 6% pf.	107½	100½	108½
West Virginia Lt., Ht. & Pwr., 7% pf.	92	94	96
West Va. Utilities, 7% pf.—50.	*m* 90	48	51½
Western Pwr., 7% pf.	102½	97½	102½
Western States Gas & Elec., 7% pf.	99½	96	105
Western States Gas & Elec., com.	38	....	....
Westinghouse Elec. & Mfg., 8% com.—50.	85½	67½	89
Weston Elec. Instrument, Cl. A $2 —no par.	31½	30	34½
Weston Elec. Instrument, com.—no par.	13½	13	18½
Wheeling Elec., 6% pf.	101	95	104
Worthington Pump, 7% pf. A.	*k* 54	46	61½
Worthington Pump, 6% B.	*k* 45	40	54½
Worthington Pump, com.	33½	20½	46
YALE & TOWNE com. $5—25.	*k*83½	70½	84½

Stock Exchange: *a*Chicago; *b*St. Louis; *c*Philadelphia; *d*Boston; *e*Baltimore; *f* Montreal; *g*Cincinnati; *h*San Francisco; *i*Pittsburgh; *j*Washington. *k*Bid price Saturday, Aug. 27. *l*Bid price Wednesday, Aug. 31. *m*Latest quotations available. †Dividend rate variable.

nies, who celebrated his fiftieth birthday on Aug. 21, officials and employees of the Bankers' Trust Company, Little Rock, purchased $123,600 worth of preferred stock of the Arkansas Power & Light Company. Mr. Couch is a director in the trust company. The stock purchased represents 1,200 shares and added 60 members of the Bankers Trust Company organization to the number already owning stock in the power and light company. The purchase was made through the preferred-stock department and employees of the company, and approximately 60 employees of the Arkansas Power & Light Company received credit for effecting the sale.

New Issues in August Total $67,000,000

During the month of August new offerings of electric light and power securities amounted to $66,711,450 as compared with $80,997,500 in July, a decrease of more than 17 per cent. This marked decline in new financing during the summer is not at all unusual, previous years showing a similar tendency. Stock, bond and note issues floated by electric service companies in August, 1926, totaled only $49,759,000, a decrease from $107,476,040 in the preceding month, and in August, 1925, the total dropped to $47,525,000 from $70,488,000 in July. In spite of this summer dullness the electric light and power companies have floated new securities thus far this year to the amount of $943,416,700 (par value) against $883,121,000 for the similar eight-month period of 1926.

Only ten companies participated in the new financing during August, so that the volume of the offerings rather than their number accounts for the total. The largest individual offering was made by the New England Gas & Electric Association in the form of 5 per cent convertible gold debenture bonds totaling $17,000,000. Attention is called to the prominence of refunding operations in the month's activities. The average yield was 5.36 per cent.

Company Reports

Name of Company	Gross Earnings Twelve Months Ended July 31 1927	1926
Adirondack Power & Light	$9,576,516	$8,877,906
Baton Rouge Electric	1,013,089	904,996
Blackstone Valley Gas & Electric & Subs	5,785,722	5,343,842
Brazilian Trac., Lt. & Pwr.	21,767,072	22,557,609
Cape Breton Electric	650,848	588,721
Community Power & Light	4,215,946	3,863,646
Edison Electric Illuminating of Brockton	1,881,747	1,718,150
Electric Light & Power of Abington & Rockland	600,890	569,047
El Paso Electric & Subs.	2,936,659	2,690,128
Galveston-Houston Electric & Subs	4,897,293	4,230,335
General Gas & Elec. & Subs.	25,717,759	22,659,237
Illinois Power	2,617,711	2,578,543
Lowell Electric Light	1,757,950	1,696,699
Nevada-California Electric	5,159,096	4,871,739
New Bedford Gas & Elec. Lt.	4,281,854	4,091,283
New Jersey Power & Light	2,635,648	2,016,084
New Orleans Public Service	18,027,258	17,169,108
North Texas Electric & Subs.	2,576,661	2,501,533
Ohio Edison	1,885,441	1,717,867
Puget Sound Power & Light & Subs	14,359,708	13,178,692
Savannah Electric & Power	2,249,805	2,129,821
Sierra Pacific Electric & Subs.	1,261,079	1,176,223
Southern California Edison	29,833,073	26,424,911
Syracuse Lighting	6,864,096	6,575,374
Tampa Electric & Subs	4,836,026	4,416,373
Virginia Elec. & Pwr. & Subs.	15,146,487	13,525,022

Shareholders to Pass on Two-Hundred-Million-Dollar Issues

A special meeting of the shareholders of the Shawinigan Water & Power Company has been called for Sept. 28 for the purpose of authorizing the creation and issuance from time to time of first mortgage sinking-fund gold bonds and debenture stock to the amount of $200,000,000. Authority was given eight years ago for the creation and issuance of $50,000,000 in bonds, and at the present time there is outstanding $26,129,500. In view of the marked progress made in the last few years, the balance available is not considered sufficient to take care of the company's requirements during the next few years.

Utilities Power & Light Quadruples Output

Acquisition of additional properties and internal growth are jointly responsible for the rapid expansion of the Utilities Power & Light Corporation, one of the more aggressive utility groups of the Middle West. Power output increased fourfold in a year and gross revenue more than doubled in the same period.

The Utilities Power & Light Corporation has for some time owned all of the common stock of its four subsidiaries, the Eastern New Jersey Power, Interstate Power, Indianapolis Power & Light and Colonial Gas & Electric. These companies in turn own nearly all the common stock of their subsidiaries, which include a number of properties in rapidly developing areas. The property additions mentioned above were largely acquired through the Interstate Power Company. Since these had a number of high-priced security issues outstanding, it was decided to replace them with lower-priced capital and in the process the corporate structure of the group was greatly simplified.

Net income during the year, after all deductions, was equivalent to $30.17 a share on the average number of preferred shares outstanding during the year. After $7 per share was paid on the preferred stock, the balance of net income remaining was equal to $5.80 per share on the average number of shares of class A stock outstanding during the year. After paying $2 per share on this stock in addition to the preferred dividends, the balance of net income remaining was equal to $2.72 per share on the average number of class B shares outstanding during the year. On this stock $1.41 per share was paid. The company has no funded debt other than that of its subsidiaries. Surplus increased during 1926 by nearly $2,000,000 in addition to provision for renewals and replacements.

Security Issues of Electric Service Companies in August

Name of Company	Amount of Issue (Par Value)	Period Years	Class	Purpose	Interest Rate	Price	Per Cent Yield
Southwestern Power & Light Co.	$3,000,000	16	First lien gold bonds	To provide funds for the retirement of current indebtedness incurred for additions to properties of subsidiaries and for other corporate purposes	5	99	5.10
Central Illinois Public Service Co.	4,642,000	29	First mortgage and refunding gold bonds, series E.	Refunding and to reimburse for additions and improvements to property	5	97	5.20
Electric Investors, Inc.	1,451,250	..	Preferred stock		6	96¾	6.20
Commonwealth Power Corp.	13,208,200	..	Cumulative preferred stock	To retire funded debt and for other corporate purposes	6	100	6
American Utilities Co.	910,000	18	First lien and refunding gold bonds, series A.	To pay for properties acquired by subsidiaries, for construction and for other corporate purposes	6	100	6
Columbus Railway, Power & Light Co.	13,000,000	30	First and refunding mortgage gold bonds, series A.	To retire bonds, to reimburse company for capital additions heretofore made and for other corporate purposes	4½	93¾	4.90
Feather River Power Co.	1,000,000	..	Cumulative preferred stock, class A.	Construction	7	98	7.14
New England Gas & Electric Assn.	17,000,000	20	Convertible gold debenture bonds	To acquire or retire all bonds and preferred stocks of the operating companies, for the payment of indebtedness and for other purposes of the association	5	99	5.08
Texas-Louisiana Power Co.	500,000	19	First mortgage gold bonds, series A.	To reimburse treasury in part for improvements and extensions to its properties	6	100	6
Iowa-Nebraska Light & Power Co.	12,000,000	30	First and refunding mortgage gold bonds, series A	To acquire properties and securities	5	96½	5.20

Total	$66,711,450 (par value)	Rights	$150,000
Total amount actually realized	65,072,524	Total financing for August	$65,222,524

Business News and Market Conditions

United States Electrical Exports Decrease

The United States export trade in electrical equipment for June, 1927, showed a decline as compared both with June of last year and with the previous month this year, according to the Electrical Equipment Division of the Department of Commerce. The total value of foreign shipments for June, 1927, amounted to $7,512,670 as compared with $8,591,721 for the same month last year. Exports for May of this year amounted to $8,835,563, or $1,322,893 more than for June. This decrease is accounted for by the falling off in shipments of telephone switchboards, which amounted to only $11,561 during June this year, as compared with $1,507,038 during the same month last year. In comparing the foreign trade for the past six months, it is found that exports amounted to $48,470,084, about $210,000 more than for the same period last year.

Foreign countries continue to take an increasingly great amount of motor-driven household devices, shipments of these devices increasing $156,627 during June as compared with June, 1926, and showing a gain of $59,637 over May this year. However, domestic heating and cooking devices declined somewhat, the value of June shipments showing a decrease of $13,976. This is to be expected as the demand for such apparatus is, of course, seasonal. Shipments of electric fans for June, 1927, amounted to $95,735 as compared with $66,226 for June last year. Exports of electric lamps registered an increase of $76,647, searchlights and projectors showing the largest individual gain under this class, $34,991. The value of foreign shipments for portable electric tools and accessories and parts for motors each showed a substantial increase, $48,820 and $49,818 respectively. Electric refrigeration sets up to 1-ton capacity have continued to find a good market abroad, shipments of these devices for June increasing $11,901 over the previous month.

Additional A.I.E.E. Standards in Spanish Ready

Three additional standards of the American Institute of Electrical Engineers (Spanish edition) are now available. They are electrical standards No. 30, covering wires and cables; No. 37, on illumination, and No. 41, on insulators. They have been published by the United States Department of Commerce, Bureau of Foreign and Domestic Commerce, for distribution in Spanish-speaking countries. The translations were made by a committee of the A.I.E.E. under the direction of Dr. C.

Value and Destination of Electrical Exports for June, 1927, Compared with Corresponding Month in 1926

(Issued by Bureau of Foreign and Domestic Commerce)

Articles	June 1926	June 1927
Generators:		
Direct-current:		
Under 500 kw.	$84,962	$65,911
500 kw. and over	17,386	31,183
Alternating-current:		
Under 2,000 kva.	17,618	5,789
2,000 kva. and over	157,110	
Steam turbo-generator sets	55,549	90,283
Accessories and parts for generators	102,432	119,657
Self-contained lighting outfits	62,832	115,965
Batteries:		
Flashlight batteries	96,176	165,280
Other primary batteries	195,664	204,526
Storage batteries	278,535	303,915
Transforming or converting apparatus:		
Power transformers	96,324	79,750
Other transformers	91,565	114,326
Rectifiers, double - current and motor - generators, dynamotors, synchronous and other converters	102,677	136,731
Transmission and distribution apparatus:		
Switchboard panels, except telephone	109,938	94,473
Switches and circuit breakers over 10 amp.	150,845	116,100
Fuses and fuse blocks	23,904	32,683
Watt-hour and other measuring meters	23,755	71,818
Volt, watt and ampere meters and other recording, indicating and testing apparatus	195,357	140,553
Lightning arresters, choke coils, reactors and other protective devices	55,466	53,703
Motors, starters and controllers:		
Motors, under 1 hp.	186,452	192,227
Stationary motors:		
1 to 200 hp.	$248,527	$228,947
Over 200 hp.	70,290	27,636
Railway motors	86,139	12,266
Electric locomotives:		
Railway		
Mining and industrial	72,227	67,404
Starting and controlling equipment for electric railway and vehicle motors	16,127	4,618
Industrial motors	102,695	94,001
Portable electric tools	46,935	96,755
Accessories and parts for motors	150,738	200,557
Electric appliances:		
Electric fans	66,226	95,735
Electric lamps:		
Metal filament	122,739	139,440
Other electric lamps	18,065	27,928
Flashlights	165,399	180,491
Searchlights and projectors	31,626	66,617
Motor-driven household devices	$101,001	$257,158
Domestic heating and cooking devices	118,743	104,767
Industrial electric furnaces and ovens	15,952	33,375
Therapeutic apparatus, X-ray machines, galvanic and faradic batteries, etc.	145,497	145,107
Signal and communication devices:		
Radio apparatus:		
Transmitting sets and parts	4,849	5,806
Receiving sets	157,790	174,433
Tubes	58,851	112,756
Receiving-set components	104,478	171,574
Receiving-set accessories	118,428	134,197
Telegraph apparatus	69,047	52,898
Telephone apparatus:		
Telephone instruments	37,889	35,474
Telephone switchboards	1,507,038	11,561
Other telephone equipment	$185,050	$142,571
Railway signals, switches and attachments	32,485	66,444
Bells, buzzers, annunciators and alarms	35,500	31,323
Other electric apparatus:		
Spark plugs, magnetos and other ignition apparatus	139,731	195,970
Insulating material	121,141	120,020
Metal conduit, outlet and switch boxes	116,739	88,395
Sockets, receptacles and lighting switches	128,809	133,332
Electric lighting fixtures, interior and street	120,625	126,233
Other wiring supplies and line materials	117,894	78,914
Other electrical apparatus not elsewhere stated	635,669	523,407
Rubber and friction tape	33,446	30,374
Globes and shades for lighting fixtures	48,413	55,594
Electrical glassware except for lighting	60,063	16,929
Electrical porcelain:		
For less than 6,600 volts	76,944	53,988
For 6,600 volts and over	61,971	14,785
Carbons, carbon brushes and electrodes:		
Electrodes for electric furnaces	151,253	156,212
Other carbon products	78,735	88,477
Insulated wire and cable (iron and steel)	10,279	5,754
Copper, bare wire	294,037	137,551
Copper, insulated wire and cable	401,096	419,052
Refrigeration sets up to 1 ton capacity		430,971
Total	$8,591,721	$7,512,670

DESTINATION OF ELECTRICAL EXPORTS

Country of Destination	June, 1927
EUROPE	$1,668,004
Belgium	66,497
France	181,518
Germany	174,094
Italy	135,159
Netherlands	67,815
Spain	168,680
United Kingdom	641,901
Other countries	232,340
WESTERN HEMISPHERE	$3,927,781
Canada	1,531,775
Mexico	515,312
Cuba	282,169
Argentina	511,584
Brazil	291,166
Chile	179,961
Colombia	107,060
Peru	94,777
Venezuela	72,129
Other countries	341,848
ASIA, AFRICA AND OCEANIA	$1,916,885
British India	178,297
China	123,710
Japan	310,199
Philippine Islands	154,403
Australia	704,391
New Zealand	97,944
British South Africa	122,891
Other countries	225,050

O. Mailloux. A total of sixteen pamphlets are now available. The object of this edition is to develop a broader knowledge and use of the standards that have been developed by the A.I.E.E. and to facilitate trade in electrical products between the United States and Spanish-speaking countries.

Census of Lighting Equipment

Returns received in the annual census of lighting equipment made by the Department of Commerce show that the total value of such equipment manufactured during 1926 was $240,373,608, as against $217,793,077 in 1925 and $205,866,358 in 1924. The rate of increase from 1924 to 1926 was 16.8 per cent. Reports were received from 880 establishments for 1926, 797 for 1925 and 720 for 1924. The statistics, which cover gas, electric and other lighting equipment for the three years, are given in detail in the accompanying table.

Manufacture of Lighting Equipment: 1924 to 1926

Kind	Census Year	Number of Establishments Reporting	Value of Products	Per Cent of Increase or Decrease (—), 1924–1926
Total	1926	880	$240,373,608	16.8
	1925	797	217,793,077	
	1924	720	205,866,358	
Residence Lighting Fixtures				
Ceiling or chandelier type	1926	287	23,013,413	12.9
	1925	278	20,433,663	
	1924	202	20,377,360	
Wall or bracket type	1926	271	11,905,448	9.0
	1925	258	12,434,675	
	1924	173	10,925,857	
Portable lamps:				
Table lamps	1926	214	5,883,271	.....
	1925	*	*	
	1924	*	*	
Floor lamps	1926	225	7,419,682	.....
	1925	*	*	
	1924	*	*	
Bridge lamps	1926	157	4,773,824	.....
	1925	†	†	
	1924	†	†	
Boudoir lamps	1926	156	3,186,519	—5.8
	1925	130	3,333,471	.....
	1924	98	3,381,631	.....
Other lamps	1926	21	658,228	.....
	1925	†	†	
	1924	†	†	
Adjustable lamps	1926	48	991,827	.....
	1925	73	2,370,965	
	1924	†	†	
Candelabra and candlesticks	1926	83	722,892	—35.7
	1925	111	1,533,539	
	1924	58	1,124,329	
Lanterns and outdoor standards	1926	144	3,270,293	28.5
	1925	149	3,658,691	
	1924	90	2,544,019	
Commercial Lighting Fixtures				
Auditorium, other than church and theatre	1926	51	643,633	—34.9
	1925	74	1,293,560	
	1924	56	988,838	
Church	1926	88	1,016,750	.....
	1925	†	†	
	1924	†	†	
Theatre and stage	1926	69	1,898,240	13.8
	1925	60	1,574,416	
	1924	52	1,667,460	
Gymnasium	1926	28	250,366	.....
	1925	†	†	
	1924	†	†	
Motion picture	1926	33	1,388,681	31.3
	1925	41	1,009,253	
	1924	26	1,057,832	
Store, other than window and showcase	1926	103	2,412,327	—24.8
	1925	123	2,694,561	
	1924	127	3,205,968	
Window and showcase	1926	53	1,613,327	—9.8
	1925	65	1,663,113	
	1924	58	1,788,566	
Public building, bank, office building, etc.	1926	105	4,397,370	115.6
	1925	82	2,650,598	
	1924	78	2,039,934	
Operating and hospital	1926	56	2,769,052	1,657.6
	1925	55	624,144	
	1924	9	157,545	
Photographing, photo-engraving, and lithographing	1926	21	671,600	.....
	1925	†	†	
	1924	†	†	
Industrial Lighting Fixtures				
Factory or industrial	1926	46	5,324,161	73.8
	1925	30	3,273,374	
	1924	30	3,063,572	
Car, steam and electric railroad	1926	17	853,194	72.4
	1925	17	1,026,132	
	1924	12	495,004	
Office and drafting room	1926	18	385,351	—34.2
	1925	23	560,880	
	1924	23	585,834	
Adjustable	1926	15	296,247	—40.1
	1925	18	315,277	
	1924	19	494,433	
Desk lamps	1926	27	847,292	81.4
	1925	26	591,051	
	1924	24	466,977	
Street Lighting Fixtures				
Street lighting	1926	24	4,165,421	—31.9
	1925	17	4,366,765	
	1924	16	6,113,730	
Posts and standards	1926	19	$2,020,984	9.6
	1925	17	2,845,923	
	1924	11	1,843,974	
Marine Lighting Fixtures	1926	28	670,658	80.4
	1925	18	410,696	
	1924	15	371,714	
Shades for Lighting Fixtures				
Glass	1926	66	4,337,424	28.5
	1925	74	4,505,941	
	1924	60	3,375,705	
Porcelain	1926	7	43,751	.....
	1925	†	†	
	1924	†	†	
Silk	1926	120	8,111,962	—25.4
	1925	121	9,190,263	
	1924	106	10,877,996	
Paper and parchment	1926	78	1,877,231	38.8
	1925	59	1,433,653	
	1924	47	1,352,773	
Cretonne, linen or other fabric	1926	40	910,558	103.4
	1925	28	903,086	
	1924	15	447,715	
Tin, aluminum, brass or other metal	1926	27	624,719	12.0
	1925	15	188,885	
	1924	13	557,759	
Reed, rattan or other wood	1926	1	25,138	—33.6
	1925	3	104,800	
	1924	5	37,835	
Other shades	1926	2	1,500	.....
	1925	3	57,839	
	1924	†	†	
Globes, Bowls, Chimneys and Other Illuminating Glassware Except Shades	1926	48	8,323,424	85.3
	1925	55	9,242,694	
	1924	37	4,492,919	
Reflectors—Metal, Glass or Porcelain	1926	54	3,639,712	130.8
	1925	51	3,908,927	
	1924	35	1,576,724	
Miscellaneous Lighting Equipment				
Incandescent electric lamps, complete	1926	44	82,606,204	13.2
	1925	48	74,109,061	
	1924	57	72,982,123	
Motor-vehicle lamps, complete	1926	56	21,918,287	10.8
	1925	49	16,104,054	
	1924	57	19,782,719	
Motorcycle and bicycle lamps	1926	10	130,444	—35.3
	1925	9	236,329	
	1924	8	232,704	
Carriage and wagon lamps	1926	4	9,240	—91.2
	1925	6	57,921	
	1924	6	104,446	
Miners' lamps (carbide, electric, etc.)	1926	10	1,558,419	54.3
	1925	11	1,094,632	
	1924	11	1,009,860	
Lanterns, other than for residence lighting) hand, railroad signal, etc.)	1926	32	4,796,342	—2.3
	1925	25	4,956,882	
	1924	19	4,908,898	
Searchlights, other than marine	1926	14	630,378	31.4
	1925	11	792,471	
	1924	13	479,710	
Floodlights, other than stage	1926	18	892,329	.....
	1925	†	†	
	1924	†	†	
Headlights—locomotive, industrial and other, except motor-vehicle	1926	19	1,857,556	188.2
	1925	14	1,005,961	
	1924	16	644,497	
Incandescent mantles	1926	15	2,469,309	—4.0
	1925	15	2,717,974	
	1924	20	2,571,232	
All Other Lighting Fixtures and Equipment	1926	26	2,139,630	—5.0
	1925	37	2,387,403	
	1924	36	2,251,576	

* Not reported separately prior to 1926; schedules for 1925 and 1924 called for "table and floor lamps" as one item.
† Not called for on schedule.

Market Conditions

SALES in the electrical industry are spotty, although they aggregate a good volume. Electrical men who have been predicting a good business this fall continue in the same optimistic attitude. Central-station buying is keeping up with the estimated budget, which is above that of 1926, and although industrial-plant purchases have fallen off 10 to 15 per cent, the various industries are themselves active and their prognostications concerning fall business are good.

In New England a brisk demand for power distribution equipment is noted, motor sales are holding up well and floodlighting material has been selling actively. Sales are not very active in the New York district and are spotty. Several textile electrification contracts were closed in the Southeast. Alabama, South Carolina and Arkansas were all represented in a total business of about $170,000. In the St. Louis district sales are spotty but in good volume. The number of inquiries being received indicates a good fall business. Little change is noted in the Middle West, but the attitude is optimistic. Utility companies are busy with construction work and maintenance buying is heavy. On the Pacific Coast power-company buying is active. Within thirty days orders will be placed in Chicago for $200,000 worth of power-plant equipment for two pulp and paper plants to be built at Hoquiam and Port Townsend, Wash. These two plants will cost in excess of $4,000,000. Street-lighting systems are being installed or planned in several cities in Washington and Oregon.

Quiet Week in Metal Market, but Copper Improves

Copper has sold in much better volume than for several weeks, and prices have taken a turn for the better. Other metals have been in little demand, and prices for lead and tin are lower. Zinc has had an unusually quiet market, but prices have held. The tone of the copper market is perceptibly better. Most of the large sellers have refused to quote beneath 13¼ cents, delivered to usual Connecticut points, though business has been taken in certain directions as low as 13.05 cents. In fact, resale lots of spot copper have been sold in the New York district for as low as 12.95 cents cash. However, the cheaper offerings have been less in evidence. Every indication points to the fact that the majority of October copper remains to be bought and that some buyers have yet to provide themselves for the last half of September. A good buying movement may well be expected, therefore, within the next week or two.

On Aug. 30 the American Smelting & Refining Company again reduced its contract price for lead to 6½ cents. The present condition of the market seems to afford ample justification for the views expressed in certain quarters during the period of high prices which prevailed a month ago, namely, that there was no justification in statistics or conditions of supply and demand for the high prices and that they were caused by the buying flurry which occurred during the last week of July and the opening days of August. The demand for zinc has been very quiet.

NEW YORK METAL MARKET PRICES

	Aug. 24, 1927 Cents per Pound	Aug. 31, 1927 Cents per Pound
Copper, electrolytic	13.05–13.075	13.15–13.20
Lead, Am. S. & R. price	6.60	6.50
Antimony	11¼–11½	11¼
Nickel, ingot	35	35
Zinc spots	6¾	6.625
Tin, Straits	64¾	63.625
Aluminum, 99 per cent	26	26

Base copper price Aug. 31, 1927, 15¼ cents.

Little Change in Middle West —Attitude Optimistic

Little change in business conditions is noticeable in the Middle West. While it is generally felt that business is improving, the improvement is so gradual as to appear negligible. However, more confidence in the future is being exhibited and an optimistic attitude is becoming general. The outlook for future business is good. The various utility companies are busy with construction work. Maintenance purchasing is rather heavy and some apparatus is being ordered. Interesting orders included two 600-amp., 15-kv. vertical isolated-phase oil circuit breakers, four 667-kva., 12,000-volt outdoor-type transformers and two three-stage centrifugal evaporator supply pumps.

Jobbers in this section report a fair volume of business. Sales are gradually improving and better business is looked for this fall. Most appliances are moving in fair volume, and considerable purchasing for fall requirements is being done, one large jobber placing orders for appliances valued at $50,000.

Several Textile Electrification Contracts Let in Southeast

No individual large orders were placed by central-station companies in the Southeast, though the total volume of purchases continues satisfactory. Small power and distribution transformers and watt-hour meters continue in active demand, with the orders coming in from the territory generally. One power company's small transformer orders for the week aggregated $18,600 and meter orders $3,000. Central-station companies are purchasing line construction materials in good volume, and there has been a sharp increase in orders from municipalities for this material for maintenance work. One power company ordered creosoted pine poles totaling $3,600, while another company bought poles amounting to $2,500. Another interesting central-station order was for $5,450 worth of switching equipment. One company's wire and cable orders totaled $8,000, the majority being for lead and aluminum cable. "White-way" equipment is in active demand and several very satisfactory orders were placed, the two largest being for $12,000 and $10,000, respectively, both coming from Georgia municipalities, though several other orders ranging from $1,000 to $2,500 each are also in hand.

There was considerable activity in the textile field. Several large contracts for electrification are being let. A mill in Alabama let contracts that will call for $30,000 worth of wiring materials and additional motor equipment amounting to $35,000. Another Alabama mill ordered motor and switchboard equipment totaling $20,000. The contracts let for electrification of a textile plant in South Carolina will require $30,000 worth of wiring materials and additional motor equipment costing $15,000. An electrification contract was also let on an Arkansas mill, which work will call for $40,000 worth of wiring and motor equipment. A power contract has been executed for a new chemical plant in Georgia which will require approximately $5,000 in electrical materials.

New England Buying Electric Distribution Equipment

Brisk activity in power distribution equipment featured the New England market, with high-tension-line material and substation apparatus showing considerable life. Utility companies are buying a good deal of such equipment, and a busy fall is anticipated in connection with the extension of central-station service into industries and in the municipal pumping field. Recent sales include a ten-thousand-dollar high-tension-line material order for interconnection service in eastern New England, two transformer banks aggregating about 7,500 kva. for intercity tie-line work, $1,000 worth of underground cable racks for central Massachusetts and a 10,000-kva. substation for the interconnection of a large textile-mill hydro-electric plant with a central-station system.

Motor sales are holding up well, although a little below last week's totals, and the business offered is widely diversified as to location, application and size of units. Floodlighting has been active in connection with increased police protection in the Boston district. A Boston engineering firm is working on plans for the installation of about 10,000 kw. in steam-turbine equipment for frequency correction in a Pacific

Coast central station, but turbo-generator business in New England is quiet for the moment. Jobbers are doing a fair business, and appliance sales are comparing well with last year's totals.

Sales Spotty but in Good Volume in St. Louis District

Business in the St. Louis district continues generally good but spotty. An order for a waterwheel generator to cost $15,000 and a miscellaneous lot of transformers aggregating $7,500 was reported. Manufacturers have been figuring on some fairly good-sized contracts for equipment, and inquiries are being received in numbers which may indicate a good fall business. Medium-sized motors have been in good, steady demand for the past week. Jobbers are shipping large consignments of line materials to the south and west of the district, but there is a temporary decrease of sales in building construction materials. Orders for radio apparatus, dry batteries and eliminators are being placed in larger quantity. Sales of household appliances have improved in the last two weeks.

Power Company Buying Active on Pacific Coast

Power company orders placed on the Pacific Coast include one carload of 10-in. suspension-type insulators, valued at $9,000, and 2,500 11,000-volt pin-type insulators, valued at $3,000. Activity is recorded in the purchase of maintenance materials. Requests for bids covering two carloads of 4-in. fiber conduit and a number of carloads of assorted pole-line hardware have been received from the power companies. Other orders included distribution transformers and watt-hour meters totaling $4,500 for Hawaiian installation. A 150-kw. turbo-generator and a five-panel switchboard, valued at $12,500, for the United States Navy Yard at Mare Island, 100 1/20-hp. motors for a manufacturer of calculating machines, 102 ¼-hp. motors for a washing-machine manufacturer and additional street-lighting material for San Jose amounting to $22,000 have also been purchased. A Scotia lumber company is in the market for $3,000 worth of park cable, and the Modesto Irrigation District for 1,000 assorted cross-arms and 900 poles for a telephone line to parallel its irrigation system.

Within 30 days the Zellerbach Paper Company, through the Simonds Engineering Company of Chicago, will buy $200,000 worth of power-plant equipment for pulp and paper plants costing in excess of $4,000,000. These plants will be built at Hoquiam and Port Townsend, Wash. The initial order will involve two turbines of 5,000 kva. each and two smaller turbines, as well as a number of motors and control apparatus. Specifications for motors and control equipment for a four-hundred-thousand-dollar grain elevator at Kelso, Wash., are now in the hands of bidders. Within the next two weeks orders will be placed by the Eastern Washington Orchard Company for not less than 100 ¾-hp. and 1-hp. single-phase motors for apple-wiping machines. The sales volume of motors in the Seattle district was reported the lightest in several weeks. The Seattle city lighting department purchased $50,000 worth of incandescent lamps and 45,000 lb. of guy wire and issued a request for bids on 300 50-ft. cedar poles. Street-lighting system contracts have been let for Bellingham, Wash., and cover installation and maintenance for a five-year period at a cost of $181,000; also for Portland, Ore., at a cost of $41,000. Corvallis, Ore., is planning the installation of a lighting system which will cost in excess of $30,000.

Sales Not Very Active in New York District

Central-station companies in the New York district continue to purchase apparatus only in small quantities. Several manufacturers report August sales as below those for the corresponding month last year, and the volume of inquiries received in the past few days does not indicate any important projects for the immediate future. Industrial buyers are somewhat quiet, although a fair demand continues for motors of the smaller sizes. A manufacturer of control apparatus says that although last month's business was about 5 per cent better than that of July, it is below that of August of last year. Jobbers report conditions as spotty, with a weak demand for appliances.

Activities of the Trade

Eastern Wire & Cable Gets Control of Habirshaw

The Eastern Wire & Cable Company, which was organized under the laws of the State of Delaware, has purchased through Potter & Company, New York, more than 100,000 of the total 170,000 voting-trust certificates of the Habirshaw Cable & Wire Corporation, and at the request of the voting trustees, in order that all certificate holders should have the same opportunity to sell, the new company has authorized Potter & Company on its behalf to offer the same price, $25 a share, for all or any part of the minority voting-trust certificates for a period of 90 days from Aug. 25, 1927.

The officers of the Eastern Wire & Cable Company are: William C. Robinson of Pittsburgh, president; Franklin S. Jerome of Seymour, Conn., treasurer; Wylie Brown of New York City, vice-president, and I. A. Bennett of Pittsburgh, secretary. These four men constitute the board of directors. Mr. Robinson is president and Mr. Bennett is vice-president of the National Metal Molding Company of Pittsburgh, and Mr. Jerome is president and Mr. Brown is vice-president of the American Copper Products Corporation of Elizabeth, N. J. The purchaser states that no merger, sale of securities or changes in connection with the stock or status of the Habirshaw Cable & Wire Corporation is being considered at this time.

Atlas Conveyor to Build Coal and Other Machinery

To design and build elevators, conveyors, skip hoists, coal-weigh larries, cable-drag scrapers, ash hoppers, rakes and kindred equipment for the handling and storage of coal, coke ashes and bulk materials, the Atlas Conveyor Company has been recently organized and has opened offices at 20 South Fifteenth Street, Philadelphia. Associated with this company will be Percival K. Reed, L. G. Weygandt and E. A. Thumlert, all of whom were formerly connected with the R. H. Beaumont Company of Philadelphia, as chief engineer, Eastern sales manager and general manager respectively.

United Chromium to Develop Chromium Plating

For the purpose of developing to the fullest extent the practical application of chromium plating and of making known to American industry its many definitely established uses and advantages, United Chromium, Inc., has been organized. Through its research and engineering organizations, the corporation plans to offer its assistance to manufacturers and others interested in the possibilities of chromium plating, in order that they may utilize to the best advantage the many years of research work and experience of the pioneers in the field. The processes covered by the patent rights owned or controlled by United Chromium, Inc., are said by the company to be the result of years of experimentation and development by the Union Carbide and Carbon Research Laboratories, Inc., and the laboratories of the Chromium Corporation of America and its predecessors. These processes heretofore were owned or controlled by the Chromium Corporation of America, Electric Metallurgical Company and General Chromium Corporation. Licensing agents of United Chromium, Inc., are the Chromium Corporation of America, 120 Broadway, New York, and General Chromium Corporation, 3220 Bellevue Avenue, Detroit.

New Equipment Available

Manually Operated Indoor Oil Circuit Breaker

A manually operated indoor oil circuit breaker, known as the type "E-20," especially designed for the protection of large motors and for general utility in the industrial field, has been placed on the market by the Condit Electrical Manufacturing Corporation, Boston. The breaker is furnished for 400 amp. or less, three-pole, and has an estimated interrupting capacity of 2,400 amp. at 2,500 volts. The breaker is fitted with a thermal overload trip device. The housing and frame are of heavy-gage pressed steel, and the cover is a single piece turned at the edges to exclude dripping, moisture or dust from the breaker interior. The oil tank is provided with a suitable lining, and barriers are supplied between poles to give additional protection against arcing under severe conditions.

Both the movable and stationary contact members are extra-heavy and the operating mechanism is fitted with a double-latch arrangement which makes it vibration proof. All circuit breakers are equipped with a position indicator. It can be furnished for automatic or non-automatic operation, and on automatic operation the circuit breaker will trip free on overload.

Time-Delay Push-Button Station

A push-button station for use in preventing the cutting out of motors controlled by a magnetic starter when there is a brief power disturbance has been developed by the General Electric Company. The station has two push-buttons, "start" and "stop," and bears the designation CR-2904-BS-82-A. This station is used with standard magnetic starters, making it unnecessary to add time-delay attachments to the starters theselves. When power fails, the magnetic starter will drop out but will be caused to reclose upon the return of voltage by the push-button device unless the time for which the push-button station is set is exceeded, when the "start" button must be pushed to energize the magnetic starter and so restart the motor.

Automatic Bottom Welder for Cylindrical Tanks

A carbon-arc automatic welding machine placed on the market by the Lincoln Electric Company, Cleveland, is designed for the purpose of welding bottom seams on cylindrical tanks. The equipment is standardized for tanks up to 6 ft. in diameter and 8 ft. high. Special equipment may be furnished to handle any diameter or length of tank. On No. 14 gage material a lap head seam has been welded at the rate of 135 ft. per hour. The edge weld used on the bottom of some types of range boilers may be welded at the rate of 150 ft. per hour, as the bottom is flanged and fitted so that the edges are together and flush with each other.

Tanks which are to have the bottom seam welded are set on a revolving table, and the arm carrying the automatic welding head is adusted to bring the arc on the seam. The speed of the revolving table is adustable over a wide range to handle various sizes of tanks, and the welding current is adjustable through the controls on the welder control panel. An automatic stop-and-start control is provided on the automatic welder head.

Speed Reducers with Wide Range of Ratios

The Link-Belt Sykes herringbone speed reducer, which it is said can be economically applied to all classes of service no matter how heavy or light it may be, has been placed on the market by the Link-Belt Company, Chicago. Three standard units have been developed to cover a wide range of ratios and capacities. The single-reduction unit designed as type "S" is furnished in ratios up to 10 to 1. The types "D" and "DV" are double-reduction units. The type "D" is designed for heavy duty and for ratios from 10 to 1 up to 80 to 1. The type "DV" is a light duty reducer with ratios ranging from 10 to 1 up to 130 to 1. On these units oversize Timken bearings are used, the gears rotate within a large oil reservoir, and the bearings are splash-lubricated. Special oil baffles are provided at the shaft projections to keep the dust out and the oil in.

Truck Pole Setter with Special Utility Body

The model 111, 1½-ton chassis, equipped with special utility body and pole setter, as shown in the accompanying illustration of one of these trucks in action, has been placed on the market by the Indiana Truck Corporation, Marion, Ind. The body was built in the body plant of the corporation and is provided with bows for canopy or tarpaulin top. The pole setter is operated by a special Western Electric winch mounted in the front of the body. The pole setter can be readily disassembled and carried on the brackets provided on the sides of the body.

A SPECIAL UTILITY BODY IS PROVIDED WITH THIS TRUCK POLE SETTER

Electrical Patents

Announced by U. S. Patent Office

(Issued Aug. 9, 1927)

1,638,257. ELECTRIC TERMINAL FUSE BLOCK; J. McClary Gunn, London, Ontario, Canada. App. filed July 14, 1925. Particularly adapted for use in electric stoves.

1,638,274. STARTING APPARATUS FOR SYNCHRONOUS MOTORS; H. V. Putman, Mansfield, Ohio. App. filed May 3, 1924. Including an overload relay and a bypass shunt for the relay during the starting period.

1,638,301. ELECTRIC WELDING OR SOLDERING DEVICE; R. E. Gearhart, Kansas City, Mo. App. filed Jan. 17, 1923. Transformer.

1,638,322. ELECTROMAGNETIC TIME-ELEMENT DEVICE; C. H. Chapman, Scotia, N. Y. App. filed Aug. 2, 1926.

1,638,336. ELECTRIC ARC WELDING; H. P. Himes, Detroit, Mich. App. filed April 14, 1921.

1,638,369. COLORED INCANDESCENT-LAMP BULB; F. Skaupy, Berlin, Germany. App. filed April 7, 1925.

1,638,372. TIME-ELEMENT CONTROL AND APPARATUS THEREFOR; G. E. Stack, Ballston Spa, N. Y. App. filed May 3, 1923.

1,638,407. ELECTRIC BODY COMB; O. G. Overbeck, Grimsby England. App. filed April 30, 1925.

1,638,410. ELECTRIC THERMOSTAT; G. A. Robertshaw and H. T. Hood, Greensburg, Pa. App. filed June 27, 1923. Adapted for use in connection with electric ovens.

1,638,427. ELECTRIC STORAGE BATTERY; J. L. Woodbridge, Philadelphia, Pa. App. filed Nov. 4, 1926. Terminal post seal.

1,638,438. TOOL FOR THE USE OF ELECTRICIANS; F. P. Gottschalk, Plainfield, N. J. App. filed Dec. 1, 1920. Testing tool for locating a defective fuse in an electric circuit, the tool also being adapted for the removal of a defective fuse and its replacement by a new fuse.

1,638,439. CIRCUIT CLOSER; A. H. Hopfner, Carlstadt, N. J. App. filed June 8, 1926. Which is used in combination with an alarm clock for the purpose of closing a circuit automatically at a predetermined time so that a filament lamp will illuminate a chamber or room at the time desired.

1,638,478. BATTERY-CHARGING APPARATUS; E. W. Engle, Lake Forest, Ill. App. filed Oct. 5, 1923. A method of charging high-voltage storage batteries by means of a rectifier.

1,638,510. OUTLET BOX; C. Renshaw (deceased), late of Pittsburgh, Pa. App. filed Feb. 16, 1925.

1,638,517. CONTACT-MAKING DEVICE; F. C. Bauer, Irvington, N. J. App. filed Aug. 13, 1925. For successively spelling out letters or words on electric signs.

1,638,531. ELECTRIC MOTOR; H. W. Jeannin, Toledo, Ohio. App. filed May 11, 1925. Of the repulsion-induction type.

1,638,533. PROTECTIVE DEVICE FOR USE IN POLYPHASE-CURRENT INSTALLATIONS; R. Keller, Ennetbaden, Switzerland. App. filed Nov. 3, 1925.

1,638,534. CARTRIDGE FUSE; L. W. Kelsay, New York, N. Y. App. filed July 5, 1924.

1,638,557. INSULATING COMPOUND; J. M. Wilson, Bronx, N. Y. App. filed July 30, 1924.

1,638,614. ELECTROMAGNETIC INDICATOR; F. G. Brewster, White River Junction, Vt. App. filed Feb. 25, 1922.

1,638,617. ELECTRIC SWITCH; H. E. Campbell and E. F. Mekelburg, Milwaukee, Wis. App. filed Aug. 3, 1925. Drum-type switch.

1,638,631. TRACK-BRAKE MECHANISM AND CONTROL MEANS THEREFOR; G. Hannauer, Calumet City, Ill.; and E. M. Wilcox, Hammond, Ind. App. filed May 15, 1925.

1,638,642. COMBINED SPOTLIGHT AND CIGAR LIGHTER; R. F. Schiele, Glen Ellyn, Ill. App. filed May 17, 1923.

1,638,647. ELECTRIC POWER TRANSMISSION SYSTEM; A. M. Taylor, Erdington, Birmingham, England. App. filed Jan. 11, 1927.

1,638,658. ELECTRIC SWITCH; H. O. Engstrom, Bridgeport, Conn. App. filed June 11, 1924. Of the push-through type.

1,638,660. ELECTROTHERMIC CRUCIBLE; C. R. Foley, Dayton, Ohio. App. filed Nov. 17, 1913. Induction type.

1,638,661. STREET AND STATION INDICATOR; T. B. Fotheringham and M. McIntyre, Seattle, Wash. App. filed June 1, 1926. Designed for use on cars to indicate visibily to the passengers the names of the streets or stations as they are approached.

1,638,662. ELECTRIC SOCKET SUPPORT AND HOUSING; F. A. Frerichs, Philadelphia, Pa. App. filed April 23, 1926.

1,638,686. CIRCUIT BREAKER; F. J. Fenol, Chicago, Ill. App. filed March 26, 1925. Operated by a clock.

1,638,691. LAMP-SOCKET CONSTRUCTION; L. A. Hofstetter, Union City, N. J. App. filed April 14, 1926. For Christmas tree lamps whereby when any one of a plurality of lamps in series has its filament broken the broken lamp can be quickly discovered.

1,638,718. SPEED-RESPONSIVE DEVICE; E. C. Vroman, Watertown, N. Y. App. filed April 18, 1925. Intended for use as a part of an automatic control mechanism on railway trains.

1,638,751. COMBINED CIGAR LIGHTER AND LAMP; R. F. Schiele, Glen Ellyn, Ill. App. filed May 17, 1923.

1,638,765. WOOD SEPARATOR AND METHOD OF PREPARING SAME; W. H. Grimditch, Philadelphia, Pa. App. filed March 5, 1923.

1,638,774. SELECTIVE CIRCUIT SYSTEM AND REMOTE CONTROL; A. R. Locke, Chicago, Ill. App. filed Sept. 1, 1920.

1,638,814. ELECTRICAL PRESSURE GAUGE; H. Epstein, Chicago, Ill. App. filed July 3, 1922. In which mercury forms electrical connection with a series of resistances.

(Issued Aug. 16, 1927)

16,704 (reissue). WIRE CLAMP; W. J. Carley, Culpeper, Va. App. filed Jan. 31, 1920. For use in connection with a trolley wire.

1,638,819. OVERLOAD PROTECTIVE DEVICE; J. H. Ashbaugh, Pittsburgh, Pa. App. filed Aug. 28, 1925. For a transmission line. A regulator system with means for limiting the ohmic or the reactive power load on a dynamo-electric machine and applicable for limiting the leading or lagging current drawn from a transmission line by a synchronous condenser.

1,638,822. ELECTRIC RESISTANCE FURNACE; H. M. Biebel, Oakmont, Pa. App. filed June 30, 1923.

1,638,825. REGULATOR SYSTEM; W. M. Bradshaw and J. H. Ashbaugh, Wilkinsburg, Pa. App. filed Aug. 28, 1925. For governing the excitation of dynamo-electric machines.

1,638,826. REMOVABLE FURNACE HEATING UNIT; E. J. Brannigan, Buffalo, N. Y. App. filed April 29, 1924. For electric resistance furnace.

1,638,828. ELECTRIC SNAP SWITCH; A. Carling, Hartford, Conn. App. filed April 26, 1926. Toggle type.

1,638,829. ELECTRIC HEATER UNIT; O. A. Colby, Irwin, Pa. App. filed May 7, 1924. Bowl-reflecting type.

1,638,838. OPERATING MECHANISM FOR ELECTRIC CONTROLLERS; C. T. Evans, Milwaukee, Wis. App. filed Sept. 21, 1923. Applicable to theater dimmers.

1,638,841. AUTOMATIC SYNCHRONOUS-CONVERTER SYSTEM; J. E. Foster, Pittsburgh, Pa. App. filed Nov. 28, 1923. Polarity-controlling device.

1,638,849. METHOD OF MAKING RESISTOR ELEMENTS; E. J. Haverstick, Oakmont, Pa. App. filed May 7, 1923.

1,638,856. PANTOGRAPH TROLLEY SHOE; O. M. Jorstad, East Pittsburgh, Pa. App. filed Dec. 20, 1923.

1,638,857. ELECTRIC FURNACE; A. D. Keene, Pittsburgh, Pa. App. filed Nov. 14, 1925. Control system.

1,638,872. AUTOMATIC STATION; W. L. Newmeyer, Wilkinsburg, Pa. App. filed Feb. 18, 1924. Means for indicating the speed of translating devices in such stations.

1,638,880. AUTOMATIC RECLOSING CIRCUIT INTERRUPTER; M. E. Reagan, Pittsburgh, Pa. App. filed Nov. 20, 1923.

1,638,884. MOTOR CONTROLLER; E. W. Seeger, Milwaukee, Wis. App. filed June 30, 1922. Starting controller for synchronous motors.

1,638,888. RESISTOR MATERIAL; J. Slepian, Pittsburgh, Pa. App. filed May 7, 1923. Non-metallic.

1,638,890. DYNAMO-ELECTRIC MACHINE; S. A. Staege, Pittsburgh, Pa. App. filed April 25, 1924. Synchronous motors having high starting torque.

1,638,892. METHOD OF ARC WELDING; R. Stresau, Wauwatosa, Wis. App. filed Dec. 8, 1922. Edge welding.

1,638,894. THERMOMETER; V. H. Todd, Summit, N. J. App. filed Feb. 18, 1924. For use in high-frequency circuits.

1,638,905. ELECTRIC SWITCH; C. Aalborg, Pittsburgh, Pa. App. filed Oct. 25, 1921. Of the push-button type, particularly adapted for use in connection with the testing of wattmeters.

1,638,917. COMPOUND-PENDULUM CLOCK; T. S. Casner, Plainfield, N. J. App. filed June 17, 1926. Receiving its driving force from an electromagnetically operated device.

1,638,919. ELECTRICAL SWITCH GEAR; W. A. Coates, Chorlton-cum-Hardy, and D. R. Davies, Stretford, England. App. filed Sept. 2, 1921. Inclosed type.

1,638,926. TIME SWITCH; N. Feinen, Buffalo, N. Y. App. filed June 25, 1921.

1,638,935. DOUBLE LAMP SOCKET; W. Ile, Jackson, Mich. App. filed May 9, 1925.

1,638,940. SWITCH HOUSING; H. K. Krantz, Wilkinsburg, Pa. App. filed Sept. 23, 1922. For inclosing service switches and fuses.

1,638,943. THERO-ELECTRIC CELL AND METHOD OF MAKING THE SAME; G. M. Little, Pittsburgh, Pa. App. filed Sept. 27, 1922.

1,638,944. TURBINE AGGREGATE; F. Ljungstrom, Lidingo-Brevik, Sweden. App. filed March 25, 1924. In which the housing of the electrical generator is directly secured to and supported by the housing of the condenser.

1,638,949. CLUTCH MOTOR; R. A. McCarty, Wilkinsburg, Pa. App. filed Aug. 7, 1926. Synchronous type.

1,638,995. DRY-CELL ELECTRODE; H. D. Hodge, New York, N. Y. App. filed March 24, 1925.

1,639,007. PROCESS OF BUILDING UP SELF-BAKING ELECTRODES; M. O. Sem, Oslo, Norway. App. filed Sept. 26, 1925.

1,639,015. CURLING IRON; A. C. Velten, Traverse City, Mich. App. filed Dec. 18, 1925.

1,639,038. MOTOR BRAKE; C. Jobst, Toledo, Ohio. App. filed Oct. 6, 1924. To be incorporated in a unit mechanism or machine.

1,639,077. FUSE PLUG; L. J. Cahn, New York, N. Y. App. filed July 17, 1925. Renewable.

1,639,109. METHOD OF WELDING METAL SPOKES; A. L. Putnam, Dearborn, Mich. App. filed Oct. 2, 1926.

New Trade Literature

WATT-HOUR METERS.—The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued leaflet No. 20,320, entitled "Type OB Portable Standard Watt-Hour Meters," covering recent improvements made in these meters. Their application, construction and operation are described.

WIRES AND CABLES. — The Hazard Manufacturing Company, Wilkes-Barre, Pa., has issued bulletin No. 67, describing its electrical wires and cables. It contains specifications covering Hazard standard insulation and describes the application of Hazard standard wires and cables to railroad, municipal, mining, industrial and public service operations as well as data tables.

WATERWHEEL-DRIVEN GENERATORS. — The General Electric Company, Schenectady, N. Y., has issued a bulletin entitled "Waterwheel-Driven Generators." This bulletin contains many illustrations of typical hydro-electric installations.

GEARS AND PINIONS. — Catalog No. 1579-E issued by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., covers "Micarta" gears and pinions. The catalog contains the latest data and technical information relative to their manufacture, design and form of construction. It also contains a new formula and tables based on the recommended practice of the American Gear Manufacturers' Association.

OUTDOOR STATION EQUIPMENT, FREQUENCY CHANGERS AND CONTROLLERS. — Bulletins GEA-735, GEA-759, GEA-750 and GEA-773 issued by the General Electric Company, Schenectady, N. Y., describe and illustrate its type RA-Y1 high-voltage horn-gap switch for outdoor station equipment, type LG-207 disconnecting switch and choke coil for outdoor station equipment, the G-E induction frequency changers, and CR7771 and CR7772 duplex controllers for alternating-current squirrel-cage motors and driving pumps respectively.

ANCHORS.—The W. N. Matthews Corporation, 3722 Forest Park Boulevard, St. Louis, has issued catalog sheets P, Q, R and S, covering its "Xpandix" and "Traplox" anchors.

REDUCED-VOLTAGE STARTERS. — Bulletins GEA-80A and GEA-754 issued by the General Electric Company, Schenectady, N. Y., cover its automatic reduced voltage starters and semi-automatic reduced voltage starters for synchronous motors respectively.

Business Facts for Electrical Men

Selected Statistics Presented Graphically for the Use of All Interested in Analyzing the Trend of the Electrical Business

Private Plants Holding Their Own in New England

DATA for industrial power in New England recently made available by the United States Census Bureau indicate that although there has been a continued increase in motor horsepower run on purchased energy, the increase has been paralleled by installations using energy generated in the establishments reporting. In Massachusetts about 40 per cent of the 14,500,000 hp. of electric drive is in the latter group; aside from this, there is almost 1,100,000 hp. of mechanical drive directly from thermal and water power. In Connecticut it is 32 per cent. In the two states together central-station companies have added 10,200,000 hp. of factory load since 1914, and private plants 280,000 hp.

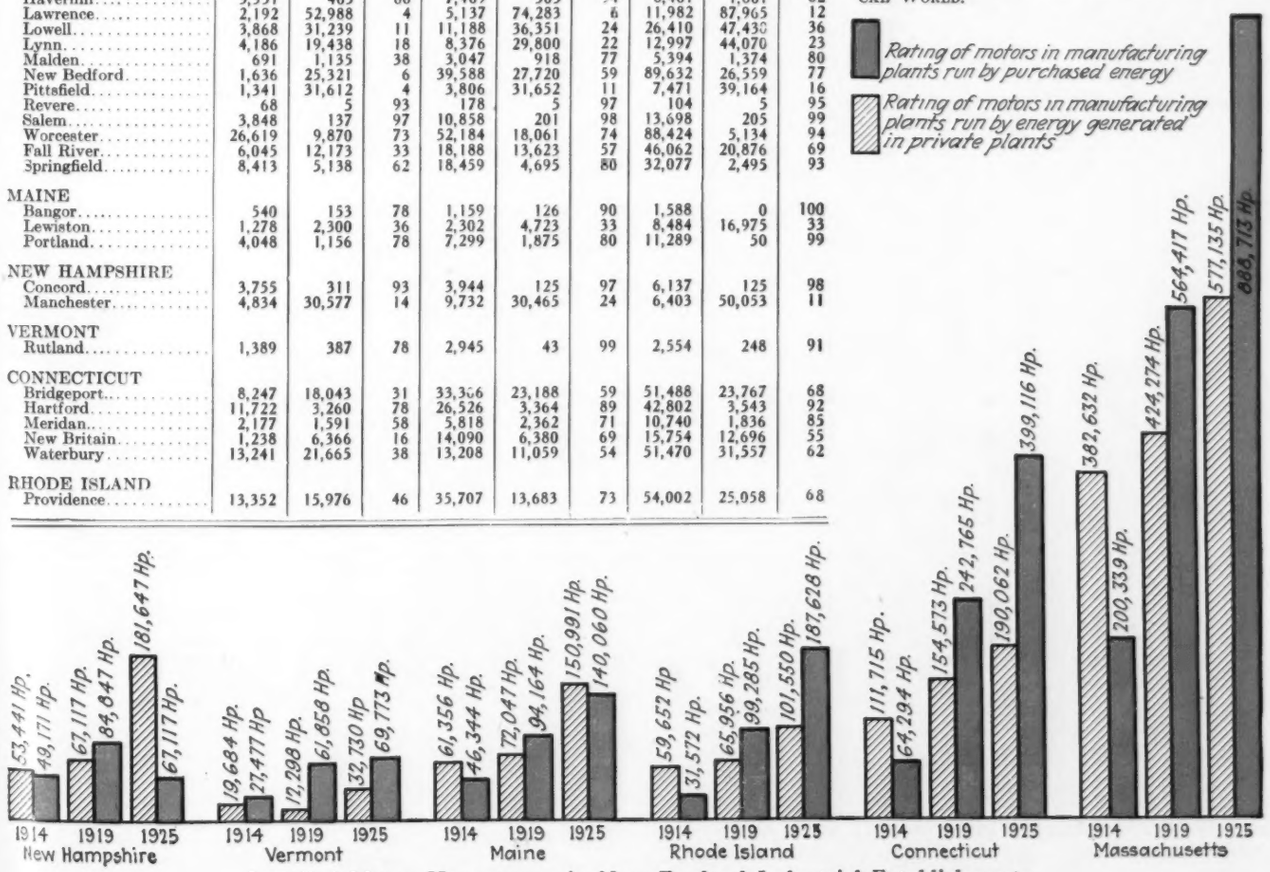
Before the war every New England state except Vermont had more motor horsepower on private than on public utility circuits. The war caused a radical change of balance. Most of the new electrification in the period from 1914 to 1919 was on central-station circuits. But the supremacy was not maintained; the building of private plants was evidently resumed with vigor, and a good part of the new motor load developed was carried by them.

The record by individual cities shows a similar trend. In a number of cases the privately driven motor horsepower had actually fallen off between 1914 and 1919, but then the tide turned. In Boston, Brockton, Cambridge, Fitchburg, Springfield, Manchester, Waterbury and Providence the story is the same—an absolute decrease in private-plant motors between 1914 and 1919, with a high percentage gain in horsepower run by purchased energy, and then a sharp reversal of the tide.

The Private Generating Plant Is Holding Its Position In Many New England Factories

City	1914			1919			1925		
	Motors Driven by Purchased Energy, Hp.	Motors Driven by Privately Generated Energy, Hp.	Per Cent Driven by Purchased Energy	Motors Driven by Purchased Energy, Hp.	Motors Driven by Privately Generated Energy, Hp.	Per Cent Driven by Purchased Energy	Motors Driven by Purchased Energy, Hp.	Motors Driven by Privately Generated Energy, Hp.	Per Cent Driven by Purchased Energy
MASSACHUSETTS									
Beverly	308	387	44	2,945	43	99	2,554	248	91
Boston	31,492	22,184	59	56,432	19,607	74	83,265	33,889	71
Brockton	2,989	1,349	69	7,768	807	91	9,656	1,597	86
Cambridge	6,095	10,200	37	12,193	9,856	65	25,513	14,819	63
Fitchburg	12,397	1,791	87	19,708	1,028	95	24,993	3,965	86
Haverhill	3,351	465	88	7,469	503	94	8,461	1,861	82
Lawrence	2,192	52,988	4	5,137	74,283	6	11,982	87,965	12
Lowell	3,868	31,239	11	11,188	36,351	24	26,410	47,430	36
Lynn	4,186	19,438	18	8,376	29,800	22	12,997	44,070	23
Malden	691	1,135	38	3,047	918	77	5,394	1,374	80
New Bedford	1,636	25,321	6	39,588	27,720	59	89,632	26,559	77
Pittsfield	1,341	31,612	4	3,806	31,652	11	7,471	39,164	16
Revere	68	5	93	178	5	97	104	5	95
Salem	3,848	137	97	10,858	201	98	13,698	205	99
Worcester	26,619	9,870	73	52,184	18,061	74	88,424	5,134	94
Fall River	6,045	12,173	33	18,188	13,623	57	46,062	20,876	69
Springfield	8,413	5,138	62	18,459	4,695	80	32,077	2,495	93
MAINE									
Bangor	540	153	78	1,159	126	90	1,588	0	100
Lewiston	1,278	2,300	36	2,302	4,723	33	8,484	16,975	33
Portland	4,048	1,156	78	7,299	1,875	80	11,289	50	99
NEW HAMPSHIRE									
Concord	3,755	311	93	3,944	125	97	6,137	125	98
Manchester	4,834	30,577	14	9,732	30,465	24	6,403	50,053	11
VERMONT									
Rutland	1,389	387	78	2,945	43	99	2,554	248	91
CONNECTICUT									
Bridgeport	8,247	18,043	31	33,366	23,188	59	51,488	23,767	68
Hartford	11,722	3,260	78	26,526	3,364	89	42,802	3,543	92
Meridan	2,177	1,591	58	5,818	2,362	71	10,740	1,836	85
New Britain	1,238	6,366	16	14,090	6,380	69	15,754	12,696	55
Waterbury	13,241	21,665	38	13,208	11,059	54	51,470	31,557	62
RHODE ISLAND									
Providence	13,352	15,976	46	35,707	13,683	73	54,002	25,058	68

Most of the data for statistics in the ELECTRICAL WORLD are gathered by it from original sources. Privilege is freely given to readers of the ELECTRICAL WORLD to quote for use these statistics for any legitimate purpose. While there is no requirement that the source of data be given, yet it would help the ELECTRICAL WORLD in obtaining and compiling further basic information if those who make use of these statistics would give credit to the ELECTRICAL WORLD.



Installed Motor Horsepower in New England Industrial Establishments

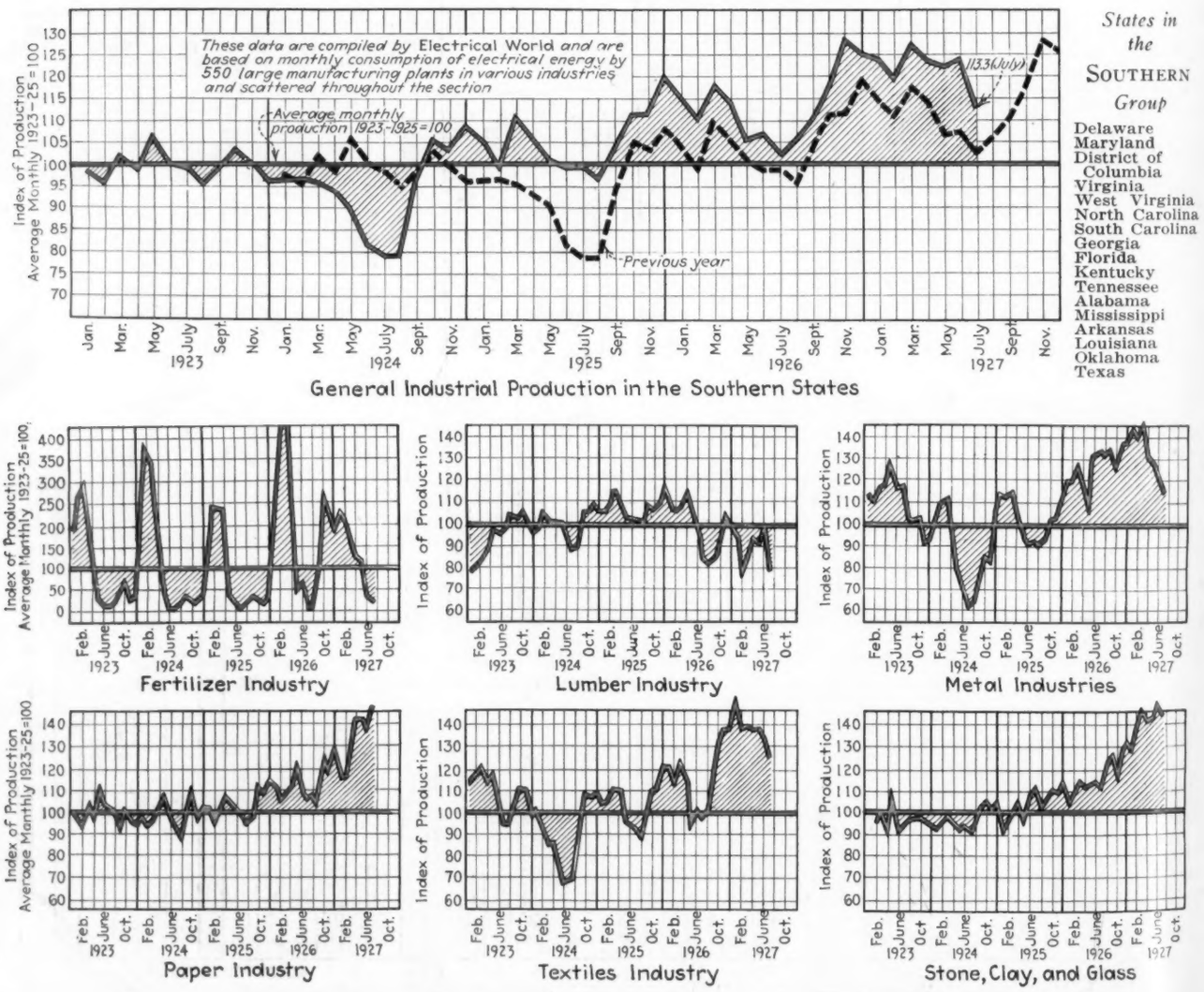
Textile Plants of the South Continue High Operations

AS WAS to be expected at this season of the year, the manufacturing plants of the Southern States reported a material drop in operations during the month of July. Productive activity during July was 5.2 per cent under June, but was still 15 per cent over the rate of activity reported for July of last year, both these figures being ascertained after corrections are made for the number of working days. The actual production of general industry during July was 8.8 per cent under that of June. Such is the present status of industrial operations of the manufacturing plants in the Southern States as pictured by the reports of monthly electrical energy consumption reported to the ELECTRICAL WORLD by about 550 manufacturing plants in various industries and scattered through the section.

The Southern States have since the war witnessed a continued slow but steady growth in the production of their manufacturing plants. Not since the slump year of 1924 has any monthly production been below that of the same month of the year previous. This is a natural reflection of the rapid economic development which has been taking place throughout the Southern States, especially since the war. Hardly a section of the South but has felt the pulse of an increased industrial activity. The present year has witnessed a continuation of this industrial growth—in fact, the productive activities of the manufacturing plants of the South during the first seven months of the present year were maintained at the spring level for a longer period than in any year since 1924. This very favorable industrial situation has been due largely to the high rate of operations which has been maintained by the textile plants since last September. As long as this primary industry continues to operate at a high level the index of general industrial operations in the South will also continue high.

The productive operations of the textile plants of the section during July were about 1.5 per cent under those of June, after corrections are made for the number of working days in the two months. The July rate of activity in this industry, however, was still about 33 per cent over that of July last year. The July rate of operations was only about 1.7 per cent under that reported for March, a remarkably low seasonal drop in operations.

The metal industries of the Southern States reported a drop in operations during July, the activity during that month being about 1.6 per cent under June, but almost 10 per cent under July of last year.

"Electrical World" Barometer of Industrial Activity in the Southern States

(Data Unadjusted for Seasonal Variation)